DOCUMENT RESUME

ED 091 172 SE 017 508

AUTHOR	Wheatley, John H.; Coon, Herbert L.
TITLE	100 Teaching Activities in Environmental Education.
INSTITUTION	ERIC Information Analysis Center for Science, Mathematics, and Environmental Education, Columbus, Ohio.
PUB DATE	[74]
NOTE	204p.; Module III of three modules to introduce teachers and others to environmental education; a related document is ED 086 541
AVAILABLE FROM	Ohio State University, Center for Science and Mathematics Education, 244 Arps Hall, Columbus, Ohio 43210 ($3.50)
EDRS PRICE	MF-$0.75 HC-$10.20 PLUS POSTAGE
DESCRIPTORS	Activity Units; *Environmental Education; Fine Arts; Fundamental Concepts; *Instructional Materials; *Interdisciplinary Approach; Language Arts; *Learning Activities; Mathematics Education; *Resource Materials; Science Education; Social Studies
IDENTIFIERS	ERIC SMEAC

ABSTRACT

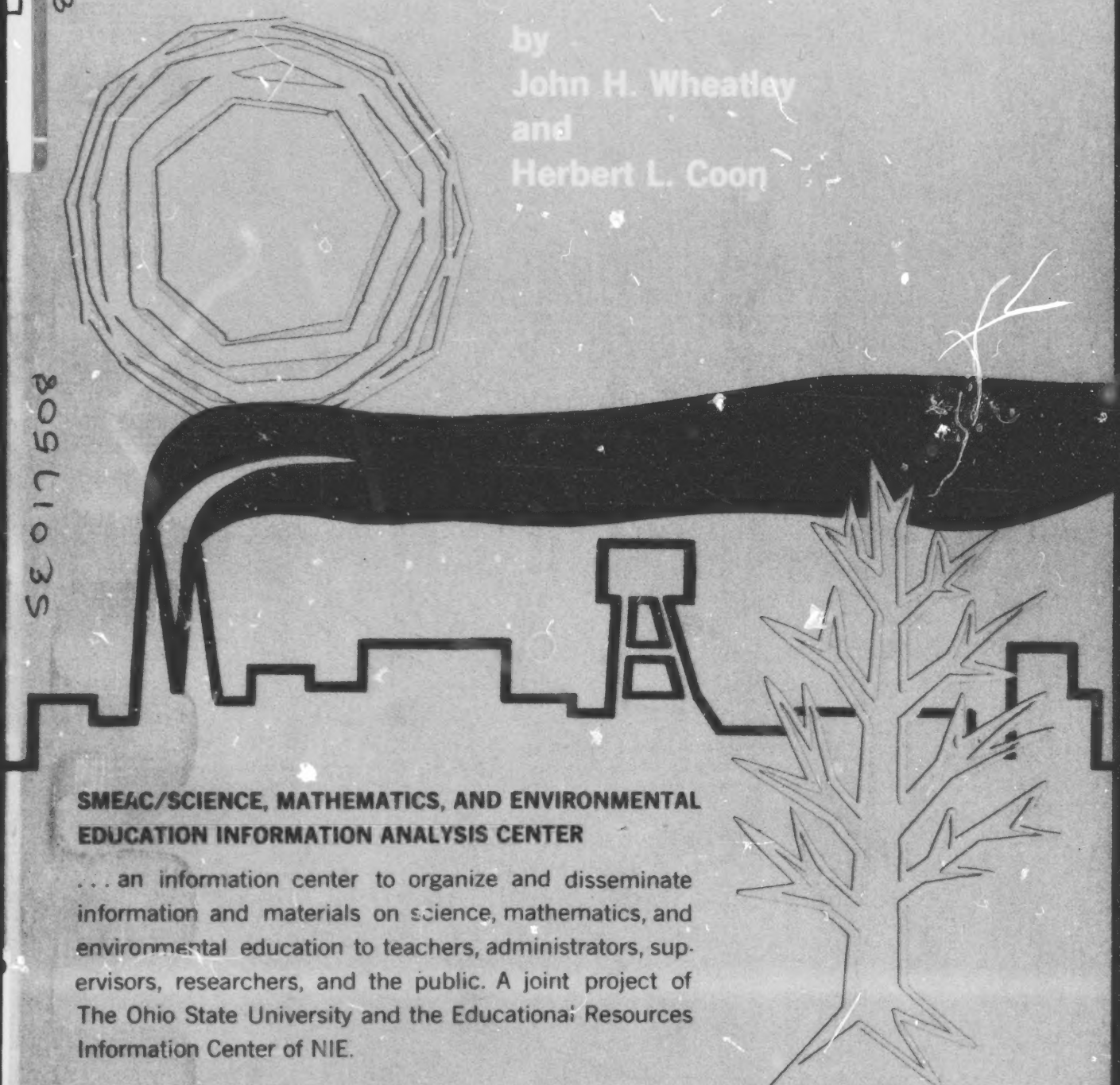
This package contains over one hundred activities in environmental education designed for student use in grades K through 12. Each activity has been classified by the editors according to the most appropriate grade level, subject matter, environmental concept involved, and environmental problem area. Subject areas are science, mathematics, social studies, language arts, and fine arts; environmental concepts include bio-physical, socio-cultural, management, and change; and problem areas are aesthetics, health, genetics, and psychological/behavioral. In addition to being classified in these four categories, each activity contains (1) a statement of purpose on how the activity may be used, and (2) a reference to a source where the activity may be found in more detail or with variations. (JP)

U.S. DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY.

ED091172
8095035

100 Teaching Activities In Environmental Education

by
John H. Wheatley
and
Herbert L. Coon



SMEAC/SCIENCE, MATHEMATICS, AND ENVIRONMENTAL EDUCATION INFORMATION ANALYSIS CENTER

. . . an information center to organize and disseminate information and materials on science, mathematics, and environmental education to teachers, administrators, supervisors, researchers, and the public. A joint project of The Ohio State University and the Educational Resources Information Center of NIE.

ED 071172

ERIC/SMEAC presents

100 TEACHING ACTIVITIES IN ENVIRONMENTAL EDUCATION

Selected and edited by

John H. Wheatley
Herbert L. Coon

Supervised by

Robert E. Roth
Associate Director of Environmental Education

The ERIC Center for Science,
Mathematics, and Environmental
Education
1800 Cannon Drive
400 Lincoln Tower
The Ohio State University
Columbus, Ohio 43210

ENVIRONMENTAL EDUCATION INFORMATION REPORTS

Environmental Education Information Reports are being issued to analyze and summarize information related to the teaching and learning of environmental education. It is hoped that these reviews will provide information for development personnel ideas for teachers, and an indication of trends in environmental education.

Your comments and suggestions for this series are invited.

Robert W. Howe
Director, ERIC/SMEAC

Sponsored by the Educational Resources Information Center of the National Institute of Education and The Ohio State University.

This publication was prepared pursuant to a contract with the National Institute of Education. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their judgment in professional and technical matters. Points of view or opinions do not, therefore, necessarily represent official National Institute of Education position or policy.

INTRODUCTION

This package contains over one hundred activities in environmental education designed by student use in grades K through 12. Each activity has been classified by the editors according to the most appropriate grade level, subject matter, environmental concept involved, and environmental problem area; the classification systems are given below and on the following pages. In addition to being classified in these four categories, each activity contains 1) a statement of purpose on how the activity may be used, and 2) a reference to a source where the activity may be found in more detail or with variations.

It is hoped that the teachers who use these materials will recognize that the classified categories and statement of purpose serve only as a guide in selecting appropriate activities and should not be a fixed structure.

CLASSIFICATION OF ENVIRONMENTAL EDUCATION ACTIVITIES

GRADE LEVEL: K - 3

4 - 6

7 - 9

10 - 12

SUBJECT AREA: Science - including health, nature studies, etc.

Mathematics - including arithmetic, geometry, etc.

Social Studies - including geography, population, history, etc.

Language Arts - including reading, creative writing, etc.

Fine Arts - including music, art, theater, etc.

BREAKDOWN OF ACTIVITIES BY CATEGORY

Total number of activities - 128
Some activities fall into more than one category in each area.

	Category	Number of Activities
Grade Level:	K - 3	21
	4 - 6	50
	7 - 9	44
	10 - 12	51
Subject Area:	Science	78
	Mathematics	15
	Social Studies	62
	Language Arts	12
	Fine Arts	14
Concepts:	Bio-physical	54
	Socio-cultural	31
	Management	27
	Change	18
Problem Area:	Aesthetics	25
	Health	9
	Genetics	2
	Psychological/ Behavioral	17

PROBLEM AREA CLASSIFICATION

modified from Brubaker, Sterling. To Live On Earth. Baltimore: The Johns Hopkins Press, 1972.

I. AESTHETIC CONSIDERATIONS:
1. odor
2. air particulate matter - visibility, irritation
3. visual pollution - signs, power lines, billboards, buildings
4. litter
5. noise
6. water quality - taste, odor
7. open spaces - urban and rural
8. city planning and convenience
9. traffic control
10. cultural opportunity
11. recreational facilities

II. HEALTH CONSIDERATIONS
1. disease control - breeding ground control
2. radioactivity
3. air quality - harmful effects (pathogens, chemicals)
4. water quality - harmful effects (pathogens, chemicals)
5. food quality - pesticides, additives
6. medical treatment

III. GENETIC CONSIDERATIONS
1. radioactivity
2. chemicals - air, water, food
3. medical treatment

IV. ECO-COMMUNITY RELATIONSHIPS
1. ecological considerations
2. land use
3. natural resource use
4. energy production
5. urban planning
6. population studies
7. species control (non-human)
8. weather
9. fertilizers and pesticides
10. effects of air quality on ecosystem
11. effects of water quality on ecosystem
12. effects of humans on ecosystem

V. PSYCHOLOGICAL AND BEHAVIORAL CONSIDERATIONS
1. crowding
2. social aspects
3. cultural considerations

CONCEPTS IN ENVIRONMENTAL EDUCATION

from Bowman, Mary Lynne Cox. The Development and Field Validation of an Instrument to Assess College Students' Attitudes Toward the Determinants of Environmental Issues. Unpublished doctoral dissertation, The Ohio State University, Columbus, Ohio, 1972.

I. BIO-PHYSICAL
1. Living things are interdependent with one another and their environment.
2. Green plants are the ultimate sources of food, clothing, shelter, and energy in most societies.
3. An organism is the product of its heredity and environment.
4. In any environment, one component - like space, water, air, or food - may become a limiting factor.
5. The natural environment is irreplaceable.

II. SOCIO-CULTURAL
1. The culture of a group is its learned behavior in the form of customs, habits, attitudes, institutions, and lifeways that are transmitted to its progeny.
2. The relationships between man and the natural environment are mediated by his culture.
3. Natural resources affect and are affected by the material welfare of a culture and directly or indirectly by philosophy, religion, government, and the arts.

III. MANAGEMENT
1. The management of natural resources to meet the needs of successive generations demands long-range planning.
2. Family planning and the limiting of family also are important if overpopulation is to be avoided and a reasonable standard of living assured for successive generations.
3. Environmental management involves the application of knowledge from many different disciplines.
4. Management is the result of technical and scientific knowledge being applied in a rational direction to achieve a particular objective.

IV. CHANGE
1. Organisms and environments are in constant change.
2. The rate of change in an environment may exceed the rate of organism adaptation.
3. All living things, including man, are continually evolving.
4. Man has been a factor affecting plant and animal succession and environmental processes.
5. Increasing human populations, rising levels of living, and the resultant demands for greater industrial and agricultural productivity promotes increasing environmental contamination.

TABLE OF CONTENTS

	Activities	Pages
Grade Level K-3		1
Science	8	
Science-Social Studies	3	
Mathematics	1	
Social Studies	1	
Language Arts	3	
Language Arts-Science	1	
Fine Arts	1	
Fine Arts-Science	2	
Fine Arts-Mathematics	1	
Grade Level 4-6		25
Science	19	
Science-Social Studies	7	
Science-Language Arts	1	
Science-Fine Arts	2	
Mathematics	2	
Mathematics-Science	2	
Social Studies	3	
Social Studies-Science	1	
Social Studies-Mathematics	2	
Social Studies-Language Arts	1	
Social Studies-Fine Arts	1	
Language Arts	1	
Language Arts-Science	1	
Language Arts-Fine Arts	1	
Fine Arts	3	
Fine Arts-Social Studies	1	
Grade Level 7-9		80
Science	11	
Science-Social Studies	5	
Science-Fine Arts	1	
Mathematics	2	
Mathematics-Science	2	
Social Studies	9	
Social Studies-Science	5	
Social Studies-Mathematics	4	
Social Studies-Fine Arts	1	
Language Arts	1	
Language Arts-Social Studies	1	
Language Arts-Fine Arts	1	
Fine Arts	1	
Grade Level 10-12		130
Science	15	
Science-Social Studies	5	
Science-Fine Arts	1	
Mathematics-Science	1	

Grade Level 10-12 (cont'd.)

Social Studies	16
Social Studies-Science	8
Social Studies-Mathematics	1
Social Studies-Fine Arts	1
Language Arts-Social Studies	2
Language Arts-Fine Arts	1

G R A D E L E V E L K - 3

Activities

Science	8
Science-Social Studies	3
Mathematics	1
Social Studies-Science	1
Language Arts	3
Language Arts-Science	1
Fine Arts	1
Fine Arts-Science	2
Fine Arts-Mathematics	1

LEVEL: K-3

SUBJECT: Science

PROBLEM AREA: IV-6 Eco-Community Relationships - Population Studies

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To help children understand the results of protective coloration.

REFERENCE: Environmental Educational Instructional Activities for Grades K-6, New York State Education Department

ACTIVITY: Secure 50 colored toothpicks in each of the following colors: red, blue, yellow, pink, and green. In an area of roughly 10 x 15 feet on the grass surface of the school grounds have two or three children imbed the colored toothpicks so that their tops do not show above the level of the grass. Have a small group of children (three or four) pretend they are birds looking for insects (the toothpicks) and see how many they can find in five minutes.

Discuss with children why they found fewer green toothpicks? What color insects are safest from birds? Does the time of year make a difference in desired coloration for protective purposes? How important is color in nature?

LEVEL: K-3

SUBJECT: Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To identify some of the sounds and smells of the season.

REFERENCE: "Environmental Curricular Materials - Level II", State Department of Public Instruction, Dover, Delaware 19901.

ACTIVITY:

How do you know it's Spring?
And how do you know it's Fall?
Suppose your eyes were always shut
And you couldn't see at all.
Could you smell and hear the Spring?
And could you feel the Fall?

- M. W. Brown

On a field trip blindfold each student (or have them shut their eyes) and have them sit quietly for several minutes. Tell each student to:

listen for the sounds
smell the fragrance
feel the touch of the season.

Have the children in a discussion describe the sounds, smells, and things they touched.

LEVEL: K-3

SUBJECT: Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To acquaint the students with some of the events occurring in nature in the fall. The differences between deciduous and evergreen trees are particularly noted as in what happens to leaves after they fall from the tree.

REFERENCE: "Environmental Curricular Materials - Level II", State Department of Public Instruction, Dover, Delaware, 19901.

ACTIVITY: Signs of Fall: Deciduous and Evergreen Trees

Take the students on a walk through a wooded area where both deciduous and evergreen trees are present. Have them observe as many things as possible that indicate fall is approaching; describe the observations in terms of colors, shapes, and sizes

Hold a discussion in a convenient place while outdoors. (This can be held in the classroom if no other place is available.) Develop such questions as:

How many different colors can you find?
Which tree has the brightest yellow leaves?
red leaves?
What causes the leaves to turn colors? (Be sure to be prepared for this one.)
What color are most leaves on the ground?
What is happening to the leaves on the ground?
Are they whole?
Can you find bits of leaves in the soil?
The leaves of many evergreen trees look like needles. Do all trees lose their leaves (evergreen trees, too)?
Can you find the leaves (needles) of evergreen trees on the ground?
Are there any dead leaves (needles) on the tree?
Do all trees lose the leaves at the same time?

As a follow-up activity, bring some leaves (including needles) into the classroom. Use these to decorate a bulletin board.

LEVEL: K-3
4-5

SUBJECT: Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To observe birds a feeder. To verbally describe birds as to general characteristic - color, size, shape, etc. To identify some common species.

REFERENCE: "Environmental Curricular Materials - Level II", State Department of Public Instruction, Dover, Delaware, 19907.

ACTIVITY: Observing Birds at a Feeder

Establish a bird feeder within view of the classroom window. At regular intervals during the day allow small groups of students to observe the birds feeding, and discuss with these students some general characteristics. Ask such questions as:

How are all birds alike?
What is the color and size of a particular bird?
How do the legs and toes differ with different birds?
How do the birds behave at the feeder? Do they "eat and run" or do they stay at the feeder?
Is there a variety of food available for the birds? Do some birds prefer certain birds?
Can some of the birds be identified from a bird chart?
If people do not feed birds in the winter, where do they get their food?

Other activities might include:

Keeping a class record of birds identified.
Making a scrapbook of bird pictures and drawings.
Writing or telling a story about birds at the bird feeder.
Making bird feeders to take home.
Collecting natural food for the bird feeder.

LEVEL: K-3
4-6
7-9

SUBJECT: Science

PROBLEM AREA: IV-12 Eco-Community Relationships - Humans
I-4 Aesthetic Considerations - Litter

CONCEPT: III-3 Environmental management involves the application of knowledge from many different disciplines.

PURPOSE: Students will be able to observe directly the different kinds of waste created in their own school environment. Students will think of ways to solve some of these problems.

ACTIVITY: Waste Watching

Collect the waste baskets in your room or in several rooms (for any time period). Have the students divide the contents into groups of similar material. Let the students devise their own classification system.

Suggestions for classification systems:
Younger children: colors, shapes, sizes, smells, hardness, softness.
Others: plastics, metals, paper, organic, inorganic, biodegradable, non-biodegradable, renewable resource, nonrenewable resource.

A chart may be developed collectively or individually. Following the sorting, the following questions might be appropriate:

What is a waste basket? What is waste?
How much waste is here?
How many hours or days of waste are here?
Where will it all go?
What can we do to cut down on waste?
How can we use some of this waste right now?
(Build a sculpture, reuse scrap paper, make collages, make flower planters out of plastic containers and cans.)

Additional follow-up activities:

Trace the manufacture of one or more of the things thrown away. Example: How paper or plastic is made.
Put up a chart so students can record what waste they can reuse at home and what new ideas for reusing waste at school.

Do some experiments using aquariums. Fill one with soil, one with water, and one with air. Put in some of the waste. Observe what happens. How many days does it take to change? Describe it. Add some water to all aquariums then add soil - repeat the above questions.

Take a trip to the school incinerators - what happens here? How often is it used? What kind of anti-pollution filter is used?

Write to a manufacturer of plastics, cans, paper or other material to find out what they are doing to recycle or reuse their product.

LEVEL: K-3
4-6

SUBJECT: Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: The purpose of this exercise is described in the activity itself.

REFERENCE: Fundamentals for Understanding Environmental Problems; Environmental Education Project, Topeka Public and Parochial Schools; 1601 Van Buren; Topeka, Kansas 66612.

ACTIVITY: Construct Montages

This activity will allow you to interpret the students' meaning for the word environment.

Gather impressions, feelings, and views students have concerning the environment by having students each, or in small groups, construct montages.

For each montage to be constructed, have available a 3' x 3' sheet of paper (brown wrapping paper will do), on to which they can paste pictures, write words, draw pictures, or in any other way express their thoughts about the environment. Have available numerous magazines, newspapers, etc., from which pictures and words can be cut.

As you are discussing the students' montages, encourage them to explain why they included certain items, but do not judge their selection in terms of being right or wrong. Help each student decide why he included each item. Accept their feelings and interpretation of their environment. Encourage students to express their views.

During later sections of the unit, you can refer to ideas students expressed in their montages. For example, when discussing the sun being a source of energy, consider what they included as an energy source, if any. If they included the sun, why did they?

If the student enjoyed compiling the montage, it could prove worthwhile to save these montages and compare them with one constructed after completing the unit material. Students may wish to take their montage home to hang on the wall of their room.

LEVEL: K-3
4-6

SUBJECT: Science

PROBLEM AREA: II-4 Health Considerations - Water Quality

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To understand that some of the things man does to satisfy himself can be harmful to other living things.

REFERENCE: Environmental Educational Instructional Activities for Grades K-6. New York State Education Department.

ACTIVITY: Place a goldfish in a small aquarium or other suitable container. Add a few drops of liquid detergent and observe the fish become listless and gulp for air. Return the goldfish to clean water or the regular aquarium from where he may have been taken.

Discuss with the children what seems to happen to fish if we put detergent in its water.

Do we put much detergent into our sewage system, streams, rivers, or lakes?

Ask children to find out why their mothers use detergents rather than soap.

Is it necessary or good to try to get clothes "whiter than white", as they tell us to do on TV? Why or why not?

LEVEL: K-3
4-6

SUBJECT: Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To construct a closed terrarium.
To observe life in a "closed ecosystem".

Not only could this activity be used in a science class, it could be used at almost any level and subject.

REFERENCE: Cedar Rapids Gazette, October 26, 1969.
Anchor-Hocking Corp., Lancaster, Ohio 43130.

ACTIVITY: Terrarium

Materials: Brandy snifter, fish bowl, large bottle, or a container of some sort.
Sheet moss
Clean gravel
Potting charcoal
Potting soil (must be sterile soil)
Plants (must be compatible)
Water

Procedure: Line bottom and sides of container with moss, green side out. Make this pocket 1/4 the height of the container.

Add a layer of clean gravel (approx. 1/2 inch).

Add a layer of potting charcoal (approx. 1/4 inch).

Add potting soil, filling to the top of the pocket, and then landscape the area: e.g. hill and valley.

Planting is next. Using a spoon or pointed stick, open a place for each plant, set it in, and press the soil back around the roots.

Lightly water each plant with room temperature tap water. DO NOT OVER WATER.

Close the container. If too much water accumulates in jar, it can be opened for short periods of time.

KEEP TERRARIUM ANYWHERE IN THE INDIRECT SUNLIGHT.

LEVEL: K-3

SUBJECT: Science
Social Studies

PROBLEM AREA: I-5 Aesthetic Considerations - Noise
IV-12 Eco-Community Relationships - Humans

CONCEPT: II-2 The relationships between man and the natural environment are mediated by his culture.

III-3 Environmental management involves the application of knowledge from many different disciplines.

PURPOSE: This activity should make students aware of different types of sounds and allow the student to develop a value system involving pleasant sounds and unpleasant sounds (noise). A discussion of sources of noise and how to change or eliminate noise should be included as a part of this activity.

REFERENCE: Environmental Involvement . . ., 1971, The Dow Chemical Company: 2020 Dow Center, Barstow Building, Midland, Michigan 48640.

ACTIVITY: Sound Qualities and Noise: Kinds of Sounds

Take the class to several different "listening" places. Have them describe the sounds they hear. Make a comparison of sounds which are pleasant and which are unpleasant (noise). What causes the sounds? Can anything be done to correct the noise (polluted sounds)? Why are the sounds pleasant and unpleasant? What can be done at home to take care of the noise? Where do they think it is best to run and shout? To play table games, etc.?

Work with the children and make a list of sounds, ranking them as to which are pleasant and unpleasant. What makes these noises? What can be done to make them pleasant?

Assign children (with the help of a parent) to make a list of sounds heard at home and bring the list to school. What made these sounds? Which are pleasant and unpleasant?

Have the children draw or cut out pictures that suggest pleasant and unpleasant sounds to them. Evaluate their learning of the idea by ranking them in order from pleasantness to unpleasantness. (Or just which are and which are not noise?)

LEVEL: K-3

SUBJECT: Science
Social Studies

PROBLEM AREA: I-6 Aesthetic - Water Quality
IV-11 Eco-Community Relations

CONCEPT: III-3 Environmental management involves the application of knowledge from many different areas.

PURPOSE: Students will be able to observe some of the effects of detergents on tap water and how these effects may be treated. Used together these two activities will sensitize the students to the effects of detergents in water and possible treatment to remedy some water quality problems. The activities may be expanded to include the effect of the various water samples on living organisms (i.e. algae, Elodea, snails, small fish, etc.) and the effect of different types of detergents (e.g. low phosphate).

The use of detergents as a social problem could be made as part of a pre/post activity discussion.'

REFERENCE: Environmental Involvement. . ., 1971, The Dow Chemical Company, 2020 Dow Center, Barstow Building, Midland, Michigan 48640.

ACTIVITY: Water Pollution

Materials: one quart of soapy dish water and one quart of tap water

Procedure: Note the appearance and odor of both samples at the start. Put in a quiet area out of the sun. Let the students guess what will happen to each sample in an hour and by the next morning. Then note the appearance and odor of each sample at the suggested time intervals.

Conclusions: Did they guess right? Has anything settled out? What does this mean to the whole community? Do they think dish water is good for people to drink?

Water Pollution Treatment

Materials: The above samples of soapy dish water and tap water, filter paper or paper towels, funnel, aerator from a fish aquarium, and an empty container for each sample.

Procedure: Pour water into separate containers through the filter shaped into the funnel. Put the aerator tube into this filtered water for one hour; 24 hours. Note any change in appearance or odor. Let the children make predictions before and after each step.

Conclusions: What are their conclusions about the effects of settling, filtration, and aeration on the appearance and odor of the water?

LEVEL: K-3

SUBJECT: Science
Social Studies

PROBLEM AREA: V-3 Psychological and Behavioral Considerations - Cultural Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To understand that man's basic food resources are provided by a variety of animals and this is a result of environmental and cultural factors.

REFERENCE: "Needs and Requirements in Many Lands". Mini-unit developed by the State Department of Education, St. Paul, Minnesota 55101.

ACTIVITY: In a study of health or of foods necessary for a good diet, milk will inevitably be cited by the children as a "good food." They might be asked if this is true for children all over the world. From what animals do we get our milk? Are there large animals other than the cow that give substantial amounts of milk? The class and teacher can easily develop a list of "milk producers" around the world such as the camel, water buffalo, reindeer, goat, and yak that are used for milk and milk products.

Individual or small groups might do some elementary research concerning the areas where these animals live and why they live there, how long they live, and the quality of the milk they produce. Discussions could be held on food habits and idiosyncracies. Could we learn to drink camel milk? Eat yak butter? Why or why not? Are there some children in the world who wouldn't want to drink cow milk? Why?

LEVEL: K-3
4-6

SUBJECT: Mathematics

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-3 An organism is the product of its heredity and environment.

PURPOSE: To stimulate skills in observation. To show the repetition of designs in nature.

REFERENCE: "Environment - A Way of Teaching," Alameda County Public Schools, Hayward, California 94544.

ACTIVITY: Take the students on a nature walk through a field or wood or on the school grounds. Let each student use pencil and paper and crayons to record colors, arrangements, patterns, and designs of objects he observes. Investigate and compare these recorded observations, and look for repetition in nature. Why are these colors, arrangements, patterns, or designs repeated? Are they of any value to the object? Sample observations may include:

Green coloring
Flat leaves
Tree branching patterns
Circular patterns in flowers
Color in flowers

LEVEL: K-3
4-6

SUBJECT: Social Studies
Science

PROBLEM AREA: IV-6 Eco-Community Relationships - Population Studies

CONCEPT: II-1 The culture of a group is its learned behavior in the form of customs, habits, attitudes, institutions, and lifeways that are transmitted to its progeny.

PURPOSE: To have children differentiate between what things an animal (including man) needs in order to live and what things man wants.

REFERENCE: Environment--A Way of Teaching. Alameda County Public Schools, Hayward, California 94544.

ACTIVITY: Needs and Wants

During a nature walk, have the children quietly observe animals (insects, worms) in nature. Encourage the students to try to "guess" what the animals are doing.

In a followup discussion (in the classroom or in the field), have the children name all the things an animal needs in order to survive--include food, air (oxygen), protection (shelter), etc.

Man too is an animal. Does he need the same things?

Besides these items, what else does man need?

Does he really need them or would man just like to have them?

Name items that man may want--include friends, love, color TV set, etc.

Decide which things are most important to us as individuals. Do all agree?

Why does man want so many extra things?

Do these things make him more comfortable?

Differentiate between surviving and quality of life.

LEVEL: K-3

SUBJECT: Language Arts

PROBLEM AREA: V-3 Psychological and Behavioral Considerations - Cultural Considerations

CONCEPT: II-1 The culture of a group is its learned behavior in the form of customs, habits, attitudes, institutions, and lifeways that are transmitted to its progeny.

PURPOSE: To help pupils become more aware of words and language intonations which are related to natural objects in the environment. To help pupils improve their powers of observations while on field trips.

ACTIVITY: Prior to taking a field trip for this specific or some other purpose, tell the class that when they return to their room they will develop an experience chart on which they will categorize under the five senses the things they experienced on the trip.

They will also be asked to identify words which will describe their observations or other sense experience:

What words can be used to describe a forest or tree?
The actions of a bird?
The odor of a flower?
The feel of wet moss?
The smell of pine needles?

The activity might be culminated with a group or individual writing effort to describe as vividly as possible some of the highlights of the field trip.

LEVEL: K-3

SUBJECT: Language Arts

PROBLEM AREA: I-5 Aesthetic Considerations · Noise

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To help young children identify sounds in the environment in terms of origin and degree of pleasing quality.

REFERENCE: "A Collection of Sounds," Mini-unit prepared by State Department of Education, St. Paul, Minnesota 55101.

ACTIVITY: Using a portable tape recorder the teacher should record a variety of sounds heard in or around the school and community. It should include things readily recognizable by children such as gymnasium or playground sounds, lunchroom, typewriter, telephone, bus starting up, airplane, dog barking and phonograph playing. As each sound is played to the class, have a student try to identify the sound and indicate if it is man-made or natural. Also try to classify it as pleasant or unpleasant.

With some help from older elementary school children 6-8 kindergarten or first grade children could go into different places in the school and try to get interesting sounds for the class to listen to and try to identify and judge.

Overall the activity can be used for short periods of time over several days as children and teacher build a written record of many man-made and natural sounds, discuss why some sounds are unpleasant, and offer ideas about what can be done to make their classroom, school, home, and community better sounding places.

LEVEL: K-3

SUBJECT: Language Arts

PROBLEM AREA: I-4 Aesthetic Considerations - Litter

CONCEPT: II-1 The relationships between man and the natural environment are mediated by his culture.

PURPOSE: To increase pupil sensitivity regarding the classroom and school environment and to develop increasing responsibility for maintaining or improving school and home environment.

REFERENCE: Environmental Education - A Teacher's Guide With Inquiry and Value Seeking Strategies. Santee School District, Santee, California 92071.

ACTIVITY: Ask the children to report to their classmates on undesirable things they have seen children do around the school such as discarding trash in wrong places, damaging bushes and plants, defacing walls, and making excessive noise.

Follow up the sharing of things not to do with puppetry skits in which children act and talk about the things they and their friends should do if they want a more beautiful school and home.

LEVEL: K-3

SUBJECT: Language Arts
Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-3 An organism is the product of its heredity and environment.

PURPOSE: To develop verbal communication skills.

REFERENCE: "Environment - A Way of Teaching", Alameda County Public Schools, Hayward, California 94544.

ACTIVITY: Construct a "feel box" by cutting one end from a shoe box and covering the opening with a piece of cloth. (A large paper bag may also be used.) Place a nature object in the "feel box" without the students seeing what the object is. Have each student feel the object and describe it in as many ways as possible.

Objects that may be used include:

stones	twigs	flowers
soil	grass	acorns
leaves	moss	fern

This activity can be done with several students at the same time using several "feel boxes" or letting all of the students except one see the object before it is placed in the box and then having the one student describe it.

LEVEL: K-3

SUBJECT: Fine Arts

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

REFERENCE: "Environment - A Way of Teaching", Alameda County Public Schools, Hayward, California 94544.

ACTIVITY: Plant Dyes

Collect any or all of the plant materials listed below and make plant dyes. Using these dyes allow the students to paint pictures of the things they saw while they collected the plant materials.

Make use of the collecting time to teach conservation practices in collecting. The materials collected should not noticeably change the environment of the area in which they were found.

Blue-violet	Cherry roots	
Purple	Elderberries, Black raspberries	
Reddish-purple	Pokeweed berries	
Red-pink	Dandelion roots	Cardinal flower
	Cherries	Sorrel roots & bark
	Strawberries	Red Oak bark
	Red raspberries	Hemlock bark
Violet	Grapes	
Blue	Boiled blueberries	
Dark brown	Walnut husks, boiled	
Reddish brown	Buckeye husks	
Yellow	Golden, boiled	Onionskin
	Willow leaves	Tulip tree leaves
	March marigold	Ragweed
	Ash inner bark	Burdock
	St. Johnswort flower, boiled	
	Osage range root & bark, boiled	
Rose tan	Birch bark	Willow bark
	Sassafras root	
Green	Plantain leaves & roots, boiled	
	Nettle roots, stalk, leaves	
	Lily-of-the-Valley leaves	
Yellow orange	Bloodroot, boiled	
Salmon	Cherry bark	
Black	Walnut husks	
	Sumac leaves	

LEVEL: K-3

SUBJECT: Fine Arts
Science

PROBLEM AREA: I-10 Aesthetic Considerations - Cultural Opportunity

CONCEPT: IV-1 Organisms and environmenta are in constant change.

PURPOSE: To help young children learn something of the variety found in common natural objects such as rocks, to appreciate the beauty found in some rocks, and to be creative in arranging rocks into creative sculpture.

REFERENCE: "Collecting Rocks and Making Plunks." Mini-unit developed by the State Department of Education. St. Paul, Minnesota 55101.

ACTIVITY: Provide each child with a small paper or plastic bag in which he should plan to put about six rocks he finds interesting on a "rock hunt" taken by the class. The pupils might be well advised to select rocks no bigger than an orange or smaller than an acorn.

After some general discussion on the kinds of rocks they found (no technical terms please) the rocks can be placed on a collection table and pupils can be invited to add to the collection some interesting specimens they can find near their homes.

Give children a chance to handle or play with the rocks during free periods. If possible provide magnifying glasses for closer examination.

Encourage children to think about such things as: Do we find shiny particles in some? Why are some rocks round and others sharp? Why do some rocks have holes in them? Are some harder than others? Are some more beautiful?

Using the materials available, each child should select suitable rocks for constructing a PLUNK--imaginary animals made by gluing rocks together. Children can easily become excited about the idea of arranging and balancing different size and shape rocks to create a real or imaginary animal. It is not difficult to glue the arrangements together and use the animals in a wide range of artistic and language arts activities.

LEVEL: K-3

SUBJECT: Fine Arts
Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-3 An organism is the product of its heredity and environment.

PURPOSE: To teach color recognition. To teach observation of nature.

REFERENCE: "Environment - A Way of Teaching," Alameda County Public Schools, Hayward, California 94544.

ACTIVITY: Color Hike

Make a large color wheel including browns, tans, and grays. Go on a hike and bring back "nature's discards" of all colors. (This is a good place to teach conservation practices in collecting material.) Match objects to sections of the color wheel.

A variation on this activity would be to assign a color to one or two members of the group; let each team carry their color from the color wheel with time and collect several objects of that color.

LEVEL: K-3

SUBJECT: Fine Arts
Mathematics

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-3 An organism is the product of its heredity and environment.

PURPOSE: To develop in the student the ability to recognize basic shapes in nature.

REFERENCE: "Environment - A Way of Teaching," Alameda County Public Schools, Hayward, California 94544.

ACTIVITY: The Shape of Nature

Let each student construct basic shapes out of cardboard - square, triangle, circle, rectangle. Carrying these with them for a walk around the school yard or in a field or wood, have the students identify these basic shapes as they occur in nature.

G R A D E L E V E L 4 - 6

Activities

Science	19
Science-Social Studies	7
Science-Language Arts	1
Science-Fine Arts	2
Mathematics	2
Mathematics-Science	2
Social Studies	3
Social Studies-Science	1
Social Studies-Mathematics	2
Social Studies-Language Arts	1
Social Studies-Fine Arts	3
Language Arts	1
Language Arts-Science	1
Language Arts-Fine Arts	1
Fine Arts	3
Fine Arts-Social Studies	1

LEVEL: 4-6

SUBJECT: Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To understand more fully the effect of seasonal changes of trees, the ecology surrounding that area, and to develop greater concern for natural objects.

REFERENCE: "Adopt a Tree" mini-unit developed by the State Department of Education. St. Paul, Minnesota 55101.

ACTIVITY: Arrange to take the class on a walking or short bus trip to an area that has quite a few trees (the more the better). Inform the children before they go that two or three of them working together will "adopt" one tree that they will study throughout the year as they make repeated visits.

Make the first visit early in September to observe and record what goes on in and around your tree in Summer Make at least one visit during Autumn, Winter, and Spring to see what goes on at those times.

Each group should keep a scrapbook in which can be recorded many things such as insects found on their tree, birds and animals on or nearby, sounds and odors around their tree. Pupils can make leaf prints, bark rubbings, collect seeds, collect and examine buds and do many other activities concerning "their tree" which can be included in the scrapbook or studied further and discussed in class. Finally the children and teacher could share their findings with parents, newspaper reporters, or others who might be interested.

LEVEL: 4-6

SUBJECT: Science

PROBLEM AREA: V-3 Psychological and Behavioral Considerations - Cultural

CONCEPT: II-1 The culture of a group is its learned behavior in the form of customs, habits, attitudes, institutions, and lifeways that are transmitted to its progeny.

PURPOSE: To help children take personal responsibility for beautifying and maintaining the appearance of their school yard.

REFERENCE: Contact knowledgeable and articulate members of local garden clubs or owners of local greenhouses or garden stores.

ACTIVITY: Select a small number of classrooms and involve the students and their teachers in planning, developing, and maintaining flower beds or other planted areas which will beautify the school grounds.

Urge children to select plants which will be colorful, well-arranged, and at least some that will mature quickly. Solicit ideas, supervision, and support from parents who are interested in this type of project and who can work easily with students.

Make appropriate arrangements with principal, custodians, and parents to help students continue to be responsible for their annual plantings during summer vacation time.

LEVEL: 4-6

SUBJECT: Science

PROBLEM AREA: IV-10 Eco-Community Relationships - Air Quality

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To trace patterns of air movement in a classroom and to develop explanations for this movement.

REFERENCE: Wind--An Environmental Investigation. National Wildlife Federation and Minnesota Environmental Sciences Foundation, Inc.

ACTIVITY: Provide each child in the classroom with the fluffy part of a milkweed seed from which the seed has been removed - this is called a coma. Have children, one at a time, release the coma from a point high above their heads, watch carefully where it goes, and mark where it lands or stops. Ask each child to draw on a sheet of paper the route taken by each coma.

Children can discuss why the comae followed the paths they took rather than some others. What creates "wind" in a classroom? What creates wind outside? What seeds other than milkweed are carried by the wind? Is the wind doing "work" when it blows seeds?

LEVEL: 4-6

SUBJECT: Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To gain understanding about the differences between "rich" and "poor" soil as shown by a gross physical analysis of various soil samples and by comparing plant growth in the samples.

REFERENCE: Investigations in Ecology, Schultz and Marcuccio, Charles E. Merrill, Columbus, Ohio, 1972.

ACTIVITY: Divide the class into teams of 2 or 3 pupils. Each team should select a site in the school yard or in a nearby vacant lot where children can get two cups of soil.

In one cup, each group should plant common seeds such as peas, beans, or corn to ascertain which soil produces, over a period of a few weeks, the healthiest plants. The groups should be cautioned to handle each cup the same way; e.g., depth of planting, amount of water, sunlight, temperature.

Contents of the second cup should be analyzed carefully by the group that collected it to determine the composition of its soil sample. Using a sensitive balance or some volumetric measurements, the sample can be divided into categories such as:

living things
small stones
formerly living things (such as twigs, bits of leaves, roots, dead insects, or other organisms)
clay

What relationship exists between the composition of the soil and the rapidity and strength of plant growth in the various soil samples?

LEVEL: 4-6

SUBJECT: Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To assist inner-city children in examining closely plant and animal life in the immediate vicinity of the school. To help them understand why these organisms are able to survive and even prosper in urban settings.

REFERENCE: Environmental Study in the City by J. Rosson Overcash.

The Science Teacher, February 1971.

Environment: The Human Impact compiled by R. E. Amidei, National Science Teachers' Association, 1973.

ACTIVITY: An elementary class might undertake an "ant hunt" and locate sites on or near the school grounds where colonies are found. Individual or small groups of students can study ant behavior regarding such things as strength, food preferences, touching antennae, etc. Where and why do ants live as they do?

Pigeons on or near school property as well as near the apartments where some pupils live might also be studied. How and why the pigeon fits so easily into the city environment will easily become a natural topic for study.

On or near the school ground will likely be found some flowering tree (in spring) or small plants which are visited by bees or yellow jackets. The conditions necessary for life of these organisms and the interrelationships among them might be discussed just as insightfully in this urban setting as in a rural one.

LEVEL: 4-6

SUBJECT: Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To research the needs, habits, and life cycles of an organism.

REFERENCE: Fundamentals for Understanding Environmental Problems, Environmental Education Project, Topeka Public and Parochial Schools, 1601 Van Buren, Topeka, Kansas 66612.

ACTIVITY: FOOD WEB

The food web concepts are intended to develop within each student an understanding as to how every organism depends on and interacts with other organisms as well as the non-living environment.

Either assign or have each student select one organism from the following list. The students should search for information about the organism. Provide the students with a variety of reference material. Emphasize that every organism is part of the natural life pattern and serves some purpose within nature.

Coyote	Vulture	Fly	Spider
Mouse	Algae	Man	Dog
Rabbit	Oak Tree	Bacteria	Cow
Snake	Cattails	Mold	Tapeworm
Grass	Hawk	Earthworm	Corn
Owl	Grasshopper	Sparrow	Flea
Snail	Duck	Fish	Beaver
Deer	Beetle	Toadstool	Cat
Raccoon	Louse	Fox	Wildcat

Others may include: Bear, Grass, Wolf, Praying Mantis, Skunk, Frog, Woodpecker, and so on.

By choosing organisms from the suggested list, you will be able to illustrate most of the common relationships. If you have fewer students than organisms suggested, be sure the ones you choose will illustrate the various relationships that will be discussed.

If the students are not familiar with the word "organism," they may want to add it to their list of new words. A simple definition would be "any living plant or animal."

FOOD WEB EXERCISE

The food web exercise will give the students a concrete experience from which they can develop terms and definitions to illustrate various ways organisms are interrelated. Allow at least 30 minutes for this activity. Nearly all the activities above can be integrated into a discussion during the food web exercise.

Students should arrange their desks in a circle, leaving enough room behind so that the teacher can walk on the outside. Tape a sign with the organism's name on the front of each student's desk where all others can see. Have a skein of yarn rolled into a ball before starting the exercise.

Start by asking one student representing a consumer (for example, the coyote) to select from the other organisms one he would eat in order to obtain food. Do not start with a producer. Connect the yarn between the "eater" and the "eaten". Continue connecting "eating" organisms to "eaten" organisms until all organisms are involved in at least one path. After discussing what some animals eat, select a green plant. If students do not realize green plants make food, rather than eat other organisms, review briefly how plants use sunlight, water, carbon dioxide, and minerals and produce food and release oxygen. Emphasize that all the other organisms depend directly or indirectly on the producers. Connect the yarn from the plants to organisms that eat the plants.

Continue connecting yarn between organisms until several of the students have two or more strings. Be sure each student realizes he represents a population (all organisms of one type), thereby can be eaten by several others.

Once you have connected sufficient strings, depending on the number of relationships and concepts you wish to illustrate, have all students tape the strings to their desks. Students may want to sketch the food web they formed before leaving the circle.

When you finish your food web, hang the signs and strings from the ceiling or room lights. This will allow students to view the food web over a period of time.

For additional work, the yarn food web can be used to demonstrate the many effects which occur when one or two "strands" of the web are destroyed.

LEVEL: 4-6

SUBJECT: Science

PROBLEM AREA: II Health Considerations

CONCEPT: I-4 In any environment, one component like: space, water, air, or food may become a limiting factor.

PURPOSE: To become aware of the temperature differences present in a classroom, to understand reasons for these differences, and to consider what the results might mean to individual pupils.

REFERENCE: "Hot Spots, Cold Spots", Mini-unit prepared by State Department of Education, St. Paul, Minnesota 55101.

ACTIVITY: Divide the class into groups of two or three. If possible provide each group with a thermometer and assign responsibility for taking temperature readings at specific places in the room such as (1) near north wall at floor level, three feet above floor, six feet above floor; (2) in center of room; (3) near radiator or other heat source, one foot from heat source, three feet away (use of both metric and English units of measuring temperature and distance is recommended). On a large drawing of the room indicate temperatures found. Have discussion to explain and understand any differences. Do we have a "good" classroom in terms of healthful temperature?

Discuss individual preferences regarding comfortable temperature. Does this suggest anything regarding seating assignments in the room?

Pupils might undertake individual study of temperatures found in a room or in their entire home as an extension of this activity.

LEVEL: 4-6

SUBJECT: Science

PROBLEM AREA: I-5 Aesthetic Considerations - Noise

CONCEPT: IV-5 Increasing human populations, rising levels of living, and the resultant demands for greater industrial and agricultural productivity promotes increasing environmental contamination.

PURPOSE: To become increasingly aware of the sources and nature of noise in the environment.

REFERENCE: Noise Pollution, P.A. O'Donnell and C.W. Lavoroni, Addison-Wesley 1971.

ACTIVITY: Ask each child to keep a record for 24 hours of all sounds that bother him or interfere with his activity. Ask him, at the same time, to keep a record of the sounds he made that interfered with someone else's activity.

Develop, on the chalkboard, two master lists from the individual lists made by students.

What similarities or differences are noted?

What sounds both children? Older people? Why?

Categorize the disturbing sounds into groups such as those caused by people, automobiles, trucks, airplanes, and so forth.

What type is most common?

What, if anything, should be done to reduce noise in your community?

LEVEL: 4-6

SUBJECT: Science

PROBLEM AREA: I-2 Aesthetic Considerations - Air Particulate Matter

CONCEPT: IV-5 Increasing human populations, rising levels of living, and the resultant demands for greater industrial and agricultural productivity promotes increasing environmental contamination.

PURPOSE: To sense more fully the amount of pollution emitted by automobiles and the differences associated with age and condition of engine.

REFERENCE: Teacher Manual, Intermediate Idea 2--Air Environmental Education Project, Box 122, Grafton, Illinois.

ACTIVITY: Have the children working in pairs to make and use several vaseline-coated cardboard squares to collect exhaust emissions from different automobiles. Caution the children to hold the squares at a safe and uniform distance from the exhaust pipe in each case. Ask the owner to start his car and hold the square in place for a specified time such as 5-10 seconds.

Label the cardboard squares with the make, model, and year of the automobile.

In the classroom organize the squares according to some agreed upon plan and discuss the meaning of the data secured.

LEVEL: K-3
4-6
7-9

SUBJECT: Science

PROBLEM AREA: IV-12 Eco-Community Relationships - Humans
I-4 Aesthetic Considerations - Litter

CONCEPT: III-3 Environmental management involves the application of knowledge from many different disciplines.

PURPOSE: Students will be able to observe directly the different kinds of waste created in their own school environment. Students will think of ways to solve some of these problems.

ACTIVITY: Waste Watching

Collect the waste baskets in your room or in several rooms (for any time period). Have the students divide the contents into groups of similar material. Let the students devise their own classification system.

Suggestions for classification systems:
Younger children: colors, shapes, sizes, smells, hardness, softness.
Others: plastics, metals, paper, organic, inorganic, biodegradable, non-biodegradable, renewable resource, nonrenewable resource.

A chart may be developed collectively or individually. Following the sorting, the following questions might be appropriate:

What is a waste basket? What is waste?
How much waste is here?
How many hours or days of waste are here?
Where will it all go?
What can we do to cut down on waste?
How can we use some of this waste right now?
(Build a sculpture, reuse scrap paper, make collages, make flower planters out of plastic containers and cans.)

Additional follow-up activities:

Trace the manufacture of one or more of the things thrown away. Example: How paper or plastic is made.
Put up a chart so students can record what waste they can reuse at home and what new ideas for reusing waste at school.

Do some experiments using aquariums. Fill one with soil, one with water, and one with air. Put in some of the waste. Observe what happens. How many days does it take to change? Describe it. Add some water to all aquariums then add soil - repeat the above questions.

Take a trip to the school incinerators - what happens here? How often is it used? What kind of anti-pollution filter is used?

Write to a manufacturer of plastics, cans, paper or other material to find out what they are doing to recycle or reuse their product.

LEVEL: 4-6
7-9

SUBJECT: Science

PROBLEM AREA: IV-12 Eco-Community Relationships - Humans

CONCEPT: IV-4 Man has been a factor affecting plant and animal succession and environmental processes.

PURPOSE: To understand the relationship between compactness of soil and water infiltration rate.

REFERENCE: "Compactness Measurement" and "Water Infiltration Rate" units in Exploring the World, An Environmental Handbook prepared for School District #2, Billings, Montana.

ACTIVITY: Divide the class into groups of three and provide each group with a sharpened on one end dowel rod about 10 inches or 25 cm. long. Each group should also have a tin can such as a #5 fruit juice can with both top and bottom removed and the bead or lip cut off of one end so it can be pushed easily into the ground. Each group should also have a quart or liter measuring container and a watch with a second hand.

Ask each group to test the soil compactness in several different places near the school, playground, or other open area that is available. This can be done by pushing the sharpened end of the dowel rod into the ground by exerting as much force as possible with the flat palm of the hand (until threshhold of pain is reached). Record how far the dowel rod can be pushed in at each site measured.

At each site twist the can into the soil (sharp edge down) until it gets through surface vegetation or litter into the actual soil. Pour into the can one liter or quart of water and record the time it takes for the water to soak in completely. Data sheets such as the following might be useful.

Involve the class in considering the relationship between compactness and infiltration rate. How does soil get compacted? What type soil erodes more rapidly? Why? Is it important that water soak-in rather than run-off? Why?

Compactness of Soil
Data Sheet
(State unit of measurement)

Location of Test	Partner #1	Partner #2
In a dirt pathway		
In a lawn		
Under a bush		
In a dirt road		
Other locations:		

Water Infiltration
Data Sheet

Location and Description	Amount of water	Starting time	Ending time	Total time	Time per liter or quart
Station #1					
Station #2					
Station #3					
Station #4					

LEVEL: K-3
4-6

SUBJECT: Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To observe birds at a feeder. To describe verbally birds as to general characteristic - color, size, shape, etc. To identify some common species.

REFERENCE: "Environmental Curricular Materials - Level II", State Department of Public Instruction, Dover, Delaware, 19907.

ACTIVITY: Observing Birds at a Feeder

Establish a bird feeder within view of the classroom window. At regular intervals during the day allow small groups of students to observe the birds feeding, and discuss with these students some general characteristics. Ask such questions as:

How are all birds alike?
What is the color and size of a particular bird?
How do the legs and toes differ with different birds?
How do the birds behave at the feeder? Do they "eat and run" or do they stay at the feeder?
Is there a variety of food available for the birds? Do some birds prefer certain kinds?
Can some of the birds be identified from a bird ch chart?
If people do not feed birds in the winter, where do they get their food?

Other activities might include:

Keeping a class record of birds identified.
Making a scrapbook of bird pictures & drawings.
Writing or telling a story about birds at the bird feeder.
Making bird feeders to take home.
Collecting natural food for the bird feeder.

LEVEL: 4-6
7-9

SUBJECT: Science

PROBLEM AREA: II Health Considerations - Sound

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To become aware of the possibility that very high levels of sound may hurt plants.

REFERENCE: Environmental Education -- A Teachers' Guide with Inquiry and Value Seeking Strategies. Santee School District, Santee, California 92071.

ACTIVITY: Obtain three similar potted plants such as geraniums and place two near a sound source such as record or tape players with high volume potential. (A sound proof music room, if available, would be useful in the experiment.)

Play recorded sound at very high level to the two experimental plants for some specified period such as one hour per day. Record on a chart or log the length of time per day, the number of days, and the condition of the exposed plants compared with the control one. Observe for change in texture or firmness of plant, leaf color, and flower color as the experiment progresses.

Discuss implications of results for human beings or other animals.

LEVEL: K-3
4-6

SUBJECT: Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: The purpose of this exercise is described in the activity itself.

REFERENCE: Fundamentals for Understanding Environmental Problems, Environmental Education Project, Topeka Public and Parochial Schools, 1601 Van Buren, Topeka, Kansas 66612.

ACTIVITY: Construct Montages

This activity will allow you to interpret the students' meaning for the word environment.

Gather impressions, feelings, and views students have concerning the environment by having students each, or in small groups, construct montages.

For each montage to be constructed, have available a 3' x 3' sheet of paper (brown wrapping paper will do), on to which they can paste pictures, write words, draw pictures, or in any other way express their thoughts about the environment. Have available numerous magazines, newspapers, etc., from which pictures and words can be cut.

As you are discussing the students' montages, encourage them to explain why they included certain items, but do not judge their selection in terms of being right or wrong. Help each student decide why he included each item. Accept their feelings and interpretations of their environment. Encourage students to express their views.

During later sections of the unit, you can refer to ideas students expressed in their montages. For example, when discussing the sun being a source of energy, consider what they included as an energy source, if any. If they included the sun, why did they?

If the student enjoyed compiling the montage, it could prove worthwhile to save these montages and compare them with one constructed after completing the unit material. Students may wish to take their montage home to hang on the wall of their room.

LEVEL: 4-6
7-9

SUBJECT: Science

PROBLEM AREA: I-4 Aesthetic Considerations - Litter

CONCEPT: IV-5 Increasing human populations, rising levels of living, and the resultant demands for greater industrial and agricultural productivitv promotes increasing environmental contamination.

PURPOSE: To understand more fully the meaning of the term biodegradable and its importance in sanitary landfill operations.

REFERENCE: Teacher Manual, Senior High Idea I-Land Environmental Education Project, Box 122, Grafton, Illinois.

ACTIVITY: Working in pairs or small groups select one item commonly put into garbage cans and subsequently into the city landfill. Typical items might be paper towel, glossy magazine cover, paper, facial tissue, cardboard, saran wrap, hard plastic, rubber, food item, tin can, and aluminum foil. Cut four strips, about one by three inches in size, of the selected item. Burv the four strips separately in garden soil in a trav, milk carton, or other suitable container. Keep the soil moist and remove the strips at weekly or bi-weekly intervals. Examine for evidence of "decav". Record data on a large master chart and discuss the observed rates and extent of disintegration. What substances appear to be appropriate for landfills? What substances should not be buried in such operations? Whv?

LEVEL: K-3
4-6

SUBJECT: Science

PROBLEM AREA: II-4 Health Considerations - Water Quality

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To understand that some of the things man does to satisfy himself can be harmful to other living things.

REFERENCE: Environmental Educational Instructional Activities for Grades K-6, New York State Education Department.

ACTIVITY: Place a goldfish in a small aquarium or other suitable container. Add a few drops of liquid detergent and observe the fish become listless and gulp for air. Return the goldfish to clean water or the regular aquarium from where he may have been taken.

Discuss with the children what seems to happen to fish if we put detergent in his water.

Do we put much detergent into our sewage system, streams, rivers, or lakes?

Ask children to find out why their mothers use detergents rather than soap?

Is it necessary or good to try to get clothes "whiter than white", as they tell us to do on TV? Why or why not?

LEVEL: K-3
4-6

SUBJECT: Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To construct a closed terrarium.
To observe life in a "closed ecosystem".

Not only could this activity be used in a science class, it could be used at almost any level and subject.

REFERENCE: Cedar Rapids Gazette, October 26, 1969.
Anchor-Hocking Corp., Lancaster, Ohio 43130.

ACTIVITY: Terrarium

Materials: Brandy snifter, fish bowl, large bottle, or a container of some sort.
Sheet moss
Clean gravel
Potting charcoal
Potting soil (must be sterile soil)
Plants (must be compatible)
Water

Procedure: Line bottom and sides of container with moss, green side out. Make this pocket 1/4 the height of the container.

Add a layer of clean gravel (approx. 1/2 inch).

Add a layer of potting charcoal (approx. 1/4 inch).

Add potting soil, filling to the top of the pocket, and then landscape the area: e.g. hill and valley.

Planting is next. Using a spoon or pointed stick, open a place for each plant, set it in, and press the soil back around the roots.

Lightly water each plant with room temperature tap water. DO NOT OVER WATER.

Close the container. If too much water accumulates in jar, it can be opened for short periods of time.

KEEP TERRARIUM ANYWHERE IN THE INDIRECT SUNLIGHT.

LEVEL: 4-6
7-9

SUBJECT: Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To involve children in becoming more aware of the amount and variety of plant and animal life found in a vacant lot.

REFERENCE: Vacant Lot Studies - an Environmental Investigation, National Wildlife Federation and Minnesota Environmental Sciences Foundation, Inc.

ACTIVITY: After securing permission for a class to study a vacant lot, divide the class into teams of 3-5 and involve the teams in carefully staking out 12 feet square plots which they will study.

Each team can inventory the litter found in its plot and try to determine what effect this litter is having on plant and animal life. They may find, for example, that certain types of litter encourage or discourage growth of plants or animals.

Each team can examine its plot for signs of animal life such as burrows, tracks, or droppings. What kinds of animals live there? Why? Is any evidence found that indicates some animals are preying on some others?

Each team can inventory the kinds of plant life found in its plot. Samples can be brought into the classroom and the children can develop their own plant key to be used by all teams in locating in their plot and subsequently on a large map of the vacant lot the most prominent types of plant life. The class may choose to discuss questions such as why certain plants are found where they are. What accounts for differences found in the same plant type? Are certain animals generally found around certain plants? Why?

LEVEL: 4-6
7-9

SUBJECT: Science

PROBLEM AREA: IV-11 Eco-Community Relationships - Water Quality

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To develop understanding of the relationship between temperature and metabolic rate.

REFERENCE: Fish and Water Temperature an Environmental Investigation, National Wildlife Federation and Minnesota Environmental Sciences Foundation, Inc.

ACTIVITY: Organize the class into working teams of two or three students. Secure enough goldfish to provide two for each team. Half of the goldfish should be kept overnight at room temperature in an aerated aquarium to about 44° F or 7° C.

Provide each team with a small transparent container in which fish behavior can be observed. Observe a warm fish in its temperature water and count gill movements per minute. Take several readings to arrive at a good average figure.

Each group should then observe a cold fish in its temperature water and record respiration rate.

Collect data from every group into a large chart or matrix and analyze its significance. Graph the data to determine the rate that would be expected for a temperature between the two you have used. Involve the class in designing an experiment to check out this prediction.

Discuss whether the findings with goldfish could be generalized to other animals. Can they offer proof based on their own experience?

LEVEL: 4-6

SUBJECT: Science
Social Studies

PROBLEM AREA: V-3 Psychological and Behavioral Considerations - Cultural

CONCEPT: II-1 The culture of a group is its learned behavior in the form of customs, habits, attitudes, institutions, and lifeways that are transmitted to its progeny.

PURPOSE: To become more knowledgeable about the basic four categories of foods, the cost of foods, and the differences between our eating habits and those found in underdeveloped countries.

REFERENCE: Environmental Education - A Teachers' Guide with Inquiry and Value Seeking Strategies, Santee School District, Santee, California 92071.

ACTIVITY: Have children form five committees on types of foods: (1) breads and cereals (2) meat and poultry (3) milk and dairy products (4) fruits and vegetables (5) non-essential foods - (candy, cakes, etc.). Each committee should list all the foods they consume regularly in their category and classify them in terms of factors such as cost, necessity or luxury, year around availability, and state or county of origin.

Each committee should report its findings to the class with the aid of some charts or transparencies they have prepared. The group should explain why they (or their parents) choose to buy and eat certain foods rather than others.

Total class discussion might give attention to questions such as why do we choose expensive foods when cheaper foods are often just as nourishing? Who decides what we eat? Does America produce all of its food? Do other people in the world have as much choice in food as we do? Why or why not?

LEVEL: 4-6

SUBJECT: Science
Social Studies

PROBLEM AREA: I-2 Aesthetic Considerations - Air Particulate Matter

CONCEPT: IV-5 Increasing human populations, rising levels of living, and the resultant demands for greater industrial and agricultural productivity promotes increasing environmental contamination.

PURPOSE: To develop a greater awareness of the variety and amount of particulate matter in the air. To determine relationships between amount of pollution and time of day or week. To locate general sources of pollution for the area and to develop some suggestions for improving air quality.

REFERENCE: Using the School and Community (Teachers Handbook) Nashville, Tennessee, Metro Schools, pp. 130-131.

ACTIVITY:

Materials: Microscope slides or glass plates
Petroleum jelly
Sheet of white paper
Masking tape
Magnifying glass or microscope

Procedure: Coat one side of each slide with petroleum jelly.

Select several different places within your city or residential area to place the slide; e.g., school or home rooftop, window ledges, field. Label the location on masking tape that you attach to the slide.

Expose all slides the same length of time (6 hours, 1 day, 1 week, etc.)

After collecting the slides, place them on a sheet of white paper with coated side up. Examine under strong light with magnifying glass or microscope.

Compare exposed slides with control slides that were left indoors in a closed box or drawer.

Record data on chart such as shown on page 2.

LOCATION	TIME EXPOSED	DESCRIPTION OF PARTICLES	AMOUNT OF POLLUTION

Attempt to answer questions such as:

What kind and amount of particles were collected?
What areas had the dirtiest air?
What was the likely source of this pollution?
How might this pollution be reduced?
What might be done by individuals, community groups, industry, or government?

LEVEL: 4-6

SUBJECT: Science
Social Studies

PROBLEM AREA: IV-7 Eco-Community Relationships - Species Control (non-human)

CONCEPT: IV-2 The rate of change in environment may exceed the rate of organism adaptation.

PURPOSE: To understand that man may change the environment so much that some species find it difficult or impossible to adapt to the new conditions.

REFERENCE: Environmental Educational Instructional Activities for Grades K-6, New York State Education Department.

ACTIVITY: Have the class study the habits of animals that have been generally unsuccessful in their struggle with man - American eagle, grizzly bear, whooping crane, whale, tiger, passenger pigeon. Then study some animals such as the white-tailed deer, woodchuck, starling, English sparrow, and the rabbit as examples of animals who are more successful in man's world.

What are the major differences between the successful and unsuccessful animals? Does man have a responsibility to save endangered species? Why or why not? How would the natural balance in an area be affected if all rabbits were removed?

LEVEL: 4-6

SUBJECT: Science
Social Studies

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: Students will acquire a fuller understanding of the sources of their food supply, energy required to bring food to them, and a fuller appreciation of the enormous variety of foods available to most people living in the U.S.A.

REFERENCE: Using the School and Community (Teachers Handbook) Nashville (Tennessee) Metro Schools.

ACTIVITY: Using a chart such as shown below, students should keep a record of foods eaten during a week.

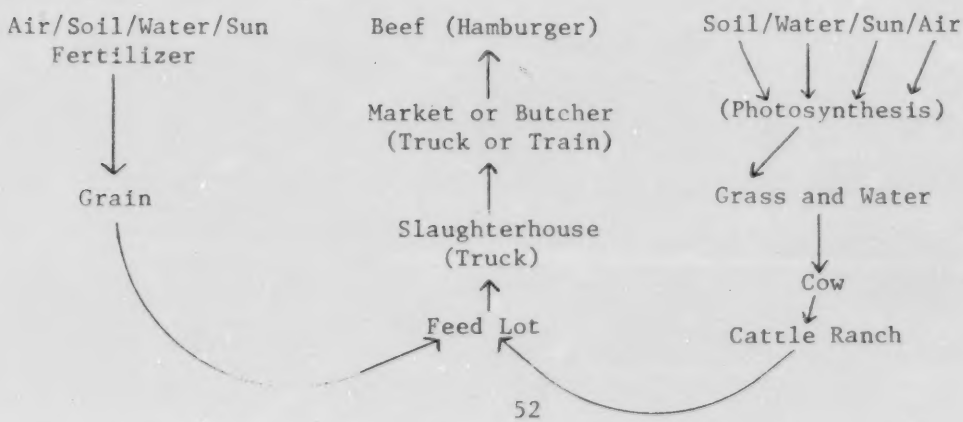
Compare this with the diet of people living in other countries, such as India, which they have studied.

Students could select different foods and trace them back through all the steps it takes for that food to get from the land to you. Find out exactly where the food product comes from. Does it come from far away? If so, how did it get to the place you bought it?

TYPES OF FOODS YOU EAT

DAY	MEAT & FISH	DAIRY PRODUCTS	BREAD & CEREAL	FRUITS & VEGETABLES	CANDY/SOFT DRINKS, ETC.

SAMPLE OF A FOOD FLOW CHART



LEVEL: 4-6

SUBJECT: Science
Social Studies

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-2 Green plants are the ultimate sources of food, clothing, shelter, and energy in most societies.

PURPOSE: To understand how man's food requirements are dependent on other organisms through food chains and food webs.

REFERENCE: Environmental Educational Instructional Activities for Grades K-6. New York State Education Department.

ACTIVITY: Have each pupil make a detailed list of all the foods he ate during one day. Select several foods which appear on most lists and direct the class discussion to make clear man's dependency on his environment.

What plants or plant products are heavily used?
What plants are needed to produce the animal products?
What is needed for plants to thrive?
Are any of the food sources threatened by pollution, drought, flood, erosion, or other factors?
What will happen to man if his food sources are threatened?
What can man do to protect his food supply?

After the class has reviewed several foods together with teacher's help, each pupil can be asked to select other foods on his personal list and, in a short written report, trace them back to the soil or sea. He might also be asked to predict whether that food is likely to be scarce or plentiful in the years ahead and give reasons for his answer.

LEVEL: 4-6
7-9

SUBJECT: Science
Social Studies

PROBLEM AREA: IV-9 Eco-Community Relationships - Fertilizers and Pesticides

CONCEPT: IV-4 Man has been a factor affecting plant and animal succession and environmental processes.

PURPOSE: To understand how compost can be made and to appreciate the potential of composting as a garbage disposal and soil-enriching process.

REFERENCE: Teacher Manual, Junior High Idea I - Land. Environmental Education Project, Box 122, Grafton, Illinois.

ACTIVITY: After some exploratory discussion on the value of composting, invite an agricultural specialist, avid organic gardener, or similar knowledgeable person to come to the class and discuss his experiences with compost making and to respond to student questions. Ask him to furnish each class member with a handout or simple bulletin on building compost piles.

Secure permission and support from the school administration to build a compost pile of appropriate size on the school site and have the class compost some of the materials now disposed of in other ways.

Use the compost to fertilize flower beds, shrubs, and other plantings on the school grounds.

Urge children, if feasible, to involve parents in a similar project at home.

LEVEL: 4-6
7-9

SUBJECT: Science
Social Studies

PROBLEM AREA: IV-3 Eco-Community Relationships - Natural Resource Use

CONCEPT: III-1 The management of natural resources to meet the needs of successive generations demands long-range planning.

PURPOSE: To develop an understanding of the natural resources involved in maintaining current consumption patterns in the United States and to develop further understanding of growing demands and competing uses for natural resources as more countries become industrialized and attempt to raise the standards of living of their people.

REFERENCE: Environmental Quality and The Citizen. Clausen and Iverson, Soil Conservation Society of America.

ACTIVITY: Have each class member list the renewable and non-renewable resources he or she has consumed in the past 24 hours and identify each as essential to survival, necessary for maintenance of life style, or luxury. List alternatives that would reduce waste of non-renewable resources.

Compile a master list of student responses and discuss interesting data that is produced.

LEVEL: 4-6

SUBJECT: Science
Language Arts

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To increase powers of observation and to become more aware of the continuous motion of living interactions in a community.

REFERENCE: Teachers Curriculum Guide for Full Ecology. Center for Environmental Education, Brevard County School System, Cocoa, Florida 32922.

ACTIVITY: Solitary Observation of Ecological Interactions

The purpose of this activity is to give the student time to observe by himself many of the living ecological interactions which he might miss while in a group.

Find an isolated spot away from other people and sit quietly for 30 minutes (or a suitable period of time).

Listen for sounds. Record all sounds that are heard and attempt an explanation of the source.

Record all smells. Attempt an explanation.

Record all that is seen. Look for the behavior of small animals (ants, pill bugs, birds, etc.) in the area. Try to determine what these animals are doing. Look for a pattern in the distribution of vegetation. What may be causing such a pattern - light, drainage, trees in the overstory?

An interesting variation of this activity is to have the students select a particular insect or other animal and follow it for 20 minutes. Keep a record of all the animal does and attempt explanations for its actions.

After the activity is completed, have the students write a paper indicating all the observations they have made. Attempt an explanation of each activity of the animal. In a summary paragraph, have the students evaluate the exercise in relation to making solitary observations as opposed to group observations.

LEVEL: 4-6

SUBJECT: Science
Fine Arts

PROBLEM AREA: I-2, 5 Aesthetic Considerations - Air Particulate Matter: Visibility, Irritation; Noise

CONCEPT: IV-5 Increasing human populations, rising levels of living, and the resultant demands for greater industrial and agricultural productivity promote increasing environmental contamination.

PURPOSE: To become aware of major sources of air and noise pollution in an urban area.

REFERENCE: Environmental Education - A Teacher's Guide with Inquiry and Value Seeking Strategies, Santee School District, Santee, California 92071.

ACTIVITY: Take a class field trip to the outdoor observation area of a tall city building or to a hill that overlooks the city. Ask the children to observe the visibility, to smell the air for recognizable or strange odors, to listen for noise and try to identify sources of noise.

Upon return to class ask the children individually, or in small groups, to reproduce what they saw in some art form and to discuss with the class questions such as:

Who is creating the pollution? Why?
Do students have any responsibility for the pollution created? What?
What sounds are necessary, or unnecessary?
What can be done about the noise problem?

LEVEL: 4-6
7-9
10-12

SUBJECT: Science
Fine Arts

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

I-2 Green plants are the ultimate sources of food, clothing, shelter, and energy in most societies.

PURPOSE: Students will construct a food pyramid to observe the complexity of relationships and maintenance of them. This activity is designed to incorporate psychomotor skills in the construction of a food pyramid so that the student may become aware of the relationships and balances involved in food chains. Skills in levers and balances concepts are also involved.

ACTIVITY: Food Pyramid Mobile

Materials: pictures of organisms (producers, consumers, and decomposers), wire (straws, wood), string, scissors (optional), glue (optional).

Procedure: Students are to construct a mobile which represents a simple food chain (pyramid) based upon their understanding of food pyramids and the ecosystem. Materials should be made available for students to use as they wish in accomplishing the objective.

Conclusions:

As you observe your mobile from top to its base, what is the relationship of numbers of organisms to place in the mobile?

Where are the producers in your mobile?

Where are the primary consumers in your mobile?

Where are the other consumers in your mobile?

What happens to your mobile when you remove one of the producers?

What happens when you remove a whole set of producers from the mobile?

What is the final consumer of your mobile?

What other organisms could be at the "top" of the mobile?

LEVEL: 4-6

SUBJECT: Mathematics

PROBLEM AREA: IV Eco-Community Relationships - Natural Resource Use

CONCEPT: III-4 Management is the result of technical and scientific knowledge being applied in a rational direction to achieve a particular objective.

PURPOSE: To help children learn that small wastages over long periods of time can add up to large amounts of natural resources and money. To help children assume responsibility for reducing wastage of pure drinking water.

REFERENCE: Investigations in Ecology by Schultz and Marcuccio, Charles E. Merrill Publishing Company, Columbus, Ohio, 1972.

ACTIVITY: Find a leaky faucet at home or at school. By use of a measuring cup and watch, calculate the amount of water wasted in one hour, one day, one month, one year. Using the cost per 100 cu. ft., calculate the financial cost of the leaky faucet. Expand the calculations by the total number of leaky faucets found in school and/or in classmate homes.

What have students done to reduce wastage of water at school or at home? Can they suggest to proper authorities that continuously running drinking fountains be replaced by more economical ones?

LEVEL: K-3
4-6

SUBJECT: Mathematics

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-3 An organism is the product of its heredity and environment.

PURPOSE: To stimulate skills in observation. To show the repetition of designs in nature.

REFERENCE: "Environment - A Way of Teaching," Alameda County Public Schools, Hayward, Calif. 94544.

ACTIVITY: Take the students on a nature walk through a field or wood or on the school grounds. Let each student use pencil and paper and crayons to record colors, arrangements, patterns, and designs of objects he observes. Investigate and compare these recorded observations, and look for repetition in nature. Why are these colors, arrangements, patterns, or designs repeated? Are they of any value to the object? Sample observations may include:

Green coloring
Flat leaves
Tree branching patterns
Circular patterns in flowers
Color in flowers

LEVEL: 4-6
7-9

SUBJECT: Mathematics
Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations.

CONCEPT: I-4 In any environment, one component like space, water, air, or food may become a limiting factor.

PURPOSE: To acquire understanding about the effect of paving, sidewalks, and buildings on water run-off including flooding and sewage systems. To compare water run-off between city and rural land.

REFERENCE: Investigations in Ecology. Schultz and Marcuccio. Charles E. Merrill, Columbus, Ohio, 1972.

ACTIVITY: Calculate the area of the school site covered by impervious material. Calculate also the area covered by vegetation which will absorb most rainfall and other areas that may absorb a smaller percentage.

Secure data from the weather bureau regarding normal annual rainfall for your area. Calculate in various units (gallons, tons, liters, kilograms) the run-off for a year.

Extend the calculations to cover a square mile of a city.

Is it important that rainfall "soak into the ground"? Why or why not?
Why are cities likely to have flood damage after a very heavy rain?
What purpose is served by storm sewers? Does your city have them?

LEVEL: 4-6
7-9

SUBJECT: Mathematics
Science

PROBLEM AREA: IV-1, 6 Eco-Community Relationships - Ecological Considerations; Population Studies

CONCEPT: I-3 An organism is the product of its heredity and environment.

PURPOSE: This activity allows the student to develop skills in constructing and interpreting graphs. Using personal data, the student collects raw data, combines the data, and draws conclusions regarding similarity and variation within the human species. Skills in using weights and measurements are used and reinforced.

REFERENCE: Fundamentals for Understanding Environmental Problems; Environmental Education Project, Topeka Public and Parochial Schools; 1601 Van Buren; Topeka, Kansas 66612.

ACTIVITY: Collecting Data and Constructing Graphs

Working in pairs, have each student collect personal information about his partner, such as height, weight, length of index finger, eye level, walking pace, reach, eye color, handspan, etc. Collect this information on a data sheet and have each student cut his data sheet in strips so each measurement is on a separate strip. Group all data from one measurement (e.g. height) together. Assign each type of measurement to student groups of two or three; have each student group construct a graph based on the data that group has on a particular characteristic. Label the base of the graph with the characteristic (e.g. height), and place frequency numbers up the left side.

After graphing the data, aid the students in understanding variation and similarity by considering such questions as the following:

What shape does the graph follow?
What is the average for each graph?
Is it possible to state that all students in class are ___ inches tall?

This concept can be further developed by considering other variations in other organisms; what causes variations; the advantages and disadvantages of some variations.

LEVEL: 4-6

SUBJECT: Social Studies

PROBLEM AREA: IV-5 Eco-Community Relationships - Urban Planning

CONCEPT: II-3 Natural resources affect and are affected by the material welfare of a culture and directly or indirectly by philosophy, religion, government, and the arts.

PURPOSE: To understand that actions taken today regarding use of the environment will reduce options available in future years.

REFERENCE: Environmental Educational Instructional Activities for Grades K-6. New York State Education Department.

ACTIVITY: Arrange to take a class field trip to some large housing project currently under construction, or to a road-building site. Ask the children to be thinking about how the site looked before construction, how it is being changed, how it will probably look 25 or 50 years from now.

After returning to class, discuss questions such as:

Is this project necessary?
Who says so?
Who decided the project was something that ought to be done?
What would need to be changed to make the project unnecessary?
What effect will this project have on me? On others in our community?

LEVEL: 4-6
7-9

SUBJECT: Social Studies

PROBLEM AREA: IV-3 Eco-Community Relationships - Natural Resource Use

CONCEPT: III-1 The management of natural resources to meet the needs of successive generations demands long-range planning.

PURPOSE: To understand that natural resources are unequally distributed in terms of land areas and political boundaries and that use or misuse of such resources is becoming a matter of world-wide concern.

REFERENCE: Environmental Educational Instructional Activities for Grades K-6. New York State Education Department.

ACTIVITY: Develop with the students a list of all the major raw materials needed to build an automobile. Have students find the sources (countries) of these materials. On a large outline map of the world which the children have prepared locate Detroit, the sources of the raw materials with a small hand-made flag of that country, and connect them with colored yarn or thread.

Through discussion examine questions such as:

- How many countries contribute to a car "made in U.S.A."?
- What raw materials needed are in short or plentiful supply?
- What has happened to the growth in automobile production during the past 10-20 years?
- What will happen if and when other countries begin making and using as many automobiles as the U.S.A. does now?

LEVEL: 4-6
7-9

SUBJECT: Social Studies

PROBLEM AREA: IV Eco-Community Relationships - Ecological Considerations.

CONCEPT: II-3 Natural resources affect and are affected by the material welfare of a culture and directly or indirectly by philosophy, religion, government and the arts.

PURPOSE: To become aware of special interest groups that are working to preserve the natural environment and to promote fuller understanding of what is meant by "the balance of nature".

REFERENCE: Social Studies Resource Units. Brevard (Florida) County Schools.

ACTIVITY: Invite a representative of a local conservation group (Audubon Society, Sierra Club, Izaak Walton League, etc.) or appropriate government agency to class to be interviewed by students.

Involve the entire class in composing key questions which will be used by four students in a "Meet the Press" type of interview with the resource person. Also provide the time for other class members to ask questions spontaneously.

Attempt to reach a class conclusion regarding the importance of such groups.

LEVEL: K-3
4-6

SUBJECT: Social Studies
Science

PROBLEM AREA: IV-6 Eco-Community Relationships - Population Studies

CONCEPT: II-1 The culture of a group is its learned behavior in the form of customs, habits, attitudes, institutions, and lifeways that are transmitted to its progeny.

PURPOSE: To have children differentiate between what things an animal (including man) needs in order to live and what things man wants.

REFERENCE: Environment--A Way of Teaching. Alameda County Public Schools, Hayward, California 94544.

ACTIVITY: Needs and Wants

During a nature walk, have the children quietly observe animals (insects, worms) in nature. Encourage the students to try to "guess" what the animals are doing.

In a followup discussion (in the classroom or in the field), have the children name all the things an animal needs in order to survive--include food, air (oxygen), protection (shelter), etc.

Man too is an animal. Does he need the same things?

Besides these items, what else does man need?

Does he really need them or would man just like to have them?

Name items that man may want--include friends, love, color TV set, etc.

Decide which things are most important to us as individuals. Do all agree?

Why does man want so many extra things?

Do these things make him more comfortable?

Differentiate between surviving and quality of life.

LEVEL: 4-6

SUBJECT: Social Studies
Mathematics

PROBLEM AREA: IV-3 Eco-Community Relationships - Natural Resource Use

CONCEPT: II-2 The relationship between man and the material environment are mediated by his culture.

I-1 Living things are interdependent with one another and their environment.

PURPOSE: Through this activity students should become aware of their dependency upon natural resources and the complex activities necessary to produce the ingredients for drop cookies. Considerations of climate, soil type, etc. should be introduced; the processes involved in converting raw materials to the necessary product - wheat to flour, cream to butter, etc. - should also be brought out. The types of measurements used may be emphasized. The culmination of the activity could be the actual making of Drop Cookies.

REFERENCE: Environmental Curriculum Material; Level III (5,6); State Department of Public Instruction. Dover, Delaware 19901.

ACTIVITY: Drop Cookies

1 cup butter
2 cups honey
2 eggs
1 3/4 cups flour
1 teaspoon soda
1 teaspoon baking powder
1/2 teaspoon salt
1 teaspoon cinnamon
2 cups rolled oats
1 cup raisins
1/2 cup chopped walnuts

If you were given fifty acres of bare soil, what would you have to plant and what animals would you have to raise before you could bake these cookies?

LEVEL: 4-6

SUBJECT: Social Studies
Mathematics

PROBLEM AREA: I-4 Aesthetic Considerations - Litter

CONCEPT: IV-5 Increasing human populations, rising levels of living, and the resultant demands for greater industrial and agricultural productivity promotes increasing environmental contamination.

PURPOSE: Students will acquire greater awareness of the thoughtless littering habits of typical American people and the enormity of the waste disposal problems created by such behavior.

REFERENCE: Using the School and Community (Teachers Handbook)
Nashville (Tennessee) Metro Schools.

ACTIVITY: Make a chart with the children, listing types of litter -- glass, paper, plastic bags, cans, bottles, metal fragments, strings, and other materials. Ask children, with parental permission, to stand for 20 minutes or so near a store, restaurant, or service station, and tally the litter dropped or thrown by adults (either walking or riding in a car). Record data for children on a separate page.

What items are most common?
Does age appear to be a significant factor?
Is there a difference between men and women?
What suggestions can you offer to reduce litter where you made your survey?

LEVEL: 4-6

SUBJECT: Social Studies
Language Arts

PROBLEM AREA: IV-2 Eco-Community Relationships

CONCEPT: II-3 Natural resources affect and are affected by the material welfare of a culture and directly or indirectly by philosophy, religion, government, and the arts.

PURPOSE: To become aware of successful positive efforts to preserve and improve our environment.

REFERENCE: Environmental Educational Instructional Activities for Grades K-6, New York State Education Department.

ACTIVITY: Divide the class into groups of 3-4 children. Ask each group to find examples, over a one week period, of current environmental improvements and preservations already completed or in progress. The examples may come from personal observations, radio, T.V., newspapers, magazines, or other sources.

Ask each group to (1) prepare a listing of their examples for display on the bulletin board, (2) select the one example they think is most important and (3) report briefly to the class about this most important example and explain why they selected it and not some other one.

LEVEL: 4-6

SUBJECT: Social Studies
Fine Arts

PROBLEM AREA: I-3 Aesthetic Considerations - Visual Pollution

CONCEPT: II-1 The culture of a group is its learned behavior in the form of customs, habits, attitudes, institutions, and lifeways that are transmitted to its progeny.

PURPOSE: To involve children in taking more responsibility for the appearance of their classrooms and schoolyard.

ACTIVITY: Organize an elementary classroom into "keep classroom neat" groups of three pupils. Each group should attempt to "decorate" the wastebasket or create an attractive and interesting waste container of some kind that would encourage children to dispose of their waste paper, etc., in the appropriate receptacle. The group of three should take "reminder responsibilities" for one week, urging children to use "their" wastebasket.

Children or classrooms might be invited to submit ideas about the location and type of litter containers they believe should be placed in school halls and in the schoolyard. A committee might select the best plans and the school art program help support the production of the winning entries.

LEVEL: 4-6

SUBJECT: Social Studies
Fine Arts

PROBLEM AREA: I-8 Aesthetic Considerations - City Planning and Convenience

CONCEPT: III-3 Environmental management involves the application of knowledge from many different disciplines.

PURPOSE: To become aware of factors that are and ought to be considered in planning man-made environments.

REFERENCE: Environmental Education - A Teachers' Guide with Inquiry and Value Seeking Strategies. Santee School District, Santee, California 92071.

ACTIVITY: Ask children to bring to class pictures and picture articles from newspapers and periodicals that illustrate man-made environments such as homes, office buildings, schools, parks, railroads, airports, shopping centers, highways, reservoirs, and so forth. Divide the pictures into categories and group the class into committees to study each type considering questions such as the following: Has their man-made environment contributed to aesthetic surroundings? Who was responsible for deciding that their environment looks like it does? Was an artist consulted? Should one have been? Has their man-made structure enhanced or damaged the appearance of the environment? Has their building effort adversely affected the area's ecology?

Finally ask each committee to sketch, make a simple model, or describe in words the ideal airport, school, shopping center, or other man-made structure which gives balanced attention to aesthetics, ecology, and economic feasibility.

LEVEL: 4-6

SUBJECT: Social Studies
Fine Arts

PROBLEM AREA: I-8 Aesthetic Considerations - City Planning and Convenience

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To assist children in understanding that their community contains specialized regions that serve different human needs. To begin to understand why these regions are located where they are and to appreciate their family traffic pattern in relationship to the regions.

REFERENCE: "Regions of the Community," Mini-unit prepared by State Department of Education, St. Paul, Minnesota 55101.

ACTIVITY: The teacher should provide each pupil with a simple dittoed map of an area they know well. If possible, the map should include a business area, residential area, commercial area, and other key areas. Children should be asked to indicate on the map or in the unmarked areas around the map the place where they live (L), play (P), buy (B), where they or someone in their family works (W), and where they or other family members get help (H). A color code can be useful in making areas stand out more clearly. Have students keep track of their travels for two days on their personal maps and then record their travels on a big classroom map they have made which may encompass a larger area of the city or community.

Where are the various colors concentrated? Why are they at that place? Are all of the areas necessary? What areas are used mostly by children? By parents? If they were planning a new city where would they locate these regions? Why?

LEVEL: 4-6

SUBJECT: Language Arts

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: III-1 The management of natural resources to meet the needs of successive generations demands long-range planning.

PURPOSE: To help children develop a feeling of responsibility in regard to their natural environment.

REFERENCE: Environmental Educational Instructional Activities for Grades K-6. New York State Education Department.

ACTIVITY: Teachers and pupils should attempt to learn about pending legislation designed to protect or improve the environment that is being considered by community, city, state, or national government.

The class should study the importance of the legislation as viewed by editorials, lay persons who have special interests in the proposal, and through class discussion.

After listing on the chalkboard some of the major reasons for affirmative legislation, each child should be asked to write a personal letter to a council member, state legislator, or appropriate executive, in which he expresses his opinion to the elected official. An effort should be made to get parents to co-sign the letters to be sent by their children.

LEVEL: 4-6

SUBJECT: Language Arts
Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: IV-1 Organisms and environments are in constant change.

PURPOSE: By combining imagination with observations, students can develop greater insight into the natural environment.

REFERENCE: Fundamentals for Understanding Environmental Problems; Environmental Education Project, Topeka Public and Parochial Schools; 1601 Van Buren; Topeka, Kansas 66612.

ACTIVITY: Write a story about a tree

Have each student select a tree they especially like. It could be near their home, at school, in the park, or some other place. After they carefully observe their tree, each student can assume they are the tree and they can write the tree's autobiography. They can consider, (1) how the tree got to its present location, (2) how many years it has been alive, (3) what animals live in its branches or use the limbs, (4) signs of damage from storms, people, and insects, (5) its neighbors, (6) how long it will live, (7) the changes that have occurred around it during its lifetime, (8) changes in its bark with time, and (9) its changes with the seasons.

LEVEL: 4-6
7-9
10-12

SUBJECT: Language Arts
Fine Arts

PROBLEM AREA: I Aesthetic Considerations

CONCEPT: II-2 The relationships between man and the natural environment are mediated by his culture.

PURPOSE: Students will express their feelings about a certain area by writing a haiku and drawing a finger-paint picture to accompany the feeling expressed by their haiku.

By using these two methods or forms of expression a student may search out his feelings about an object(s) and express these feelings. The student also works with two media of expression, enabling the student to be able to express himself more effectively.

ACTIVITY: What Do You See? ---- How Do You Feel?

Materials: paper, pencils, temper paint

Procedure: Students are asked to write a haiku about a certain area of their environment (the school lawn and building might be a good first attempt). After writing the haiku, the student is then asked to make a finger-paint picture using only two colors to accompany his haiku. The colors chosen by each student should help express his feelings. (For an example of what a haiku is, see below.)

Haiku is a form of expression, Japanese in origin, used to express kinship with things natural. It is written as follows:

1st line has 5 syllables	Brimming full of life
2nd line has 7 syllables	Heeding nature's starting gun
3rd line has 5 syllables	Pond explodes in spring.

Post and compare the works. Draw upon differences in interpretation and moods expressed. This can easily bring out socio-economic values and is a good discussion motivator. Use in a variety of environments such as parks, ponds, industries, landfills, etc.

LEVEL: 4-6

SUBJECT: Fine Arts

PROBLEM AREA: V-1 Psychological and Behavioral Considerations - Crowding

CONCEPT: II-3 Natural resources affect and are affected by the material welfare of a culture and directly or indirectly by philosophy, religion, government, and the arts.

PURPOSE: To appreci[illegible] more fully how artists have, over the centuries, at[illegible]pted to depict the beauty and variety of man's environment.

REFERENCE: Adventure in Environment
Silver Burdett Company, 1971.

ACTIVITY: The art specialist in a school can involve the class in viewing carefully a series of colored slide reproductions of world famous masterpieces depicting the beauty seen by the artists in flowers, fruit, running streams, breaking surf, and so forth. In each case the emphasis should be placed on getting children to explain the "beauty" in terms of their personal perceptions rather than concentrating on the techniques used by the artists.

Obviously, a class field trip to appropriate sections of an art museum can be useful in preceding or following up what is done in the classroom with this activity.

LEVEL: 4-6

SUBJECT: Fine Arts

PROBLEM AREA: I-7 Aesthetic Considerations - Open Spaces

CONCEPT: I-2 The culture of a group is its learned behavior in the form of customs, habits, attitudes, institutions, and lifeways that are transmitted to its progeny.

PURPOSE: To assist students in acquiring greater appreciation of the aesthetic elements found in an environment.

REFERENCE: Conceptual Approach to Art Curriculum Planning K-12, Wisconsin Department of Public Instruction Madison, Wisconsin

ACTIVITY: Identify a particularly attractive area near the school. Provide each pupil with charcoal (or other easy-to-use-media), paper, workbook or easel, and newspaper to sit on and go to the area for a sketching session in which each pupil attempts to put on paper some of the beauty he sees in the scene.

Display the results in the classroom and give each pupil a chance to explain why he selected the subject matter he used.

The activity can be complemented by a second sketching session at a particularly unattractive site.

LEVEL: 4-6

SUBJECT: Fine Arts

PROBLEM AREA: I Aesthetic Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To examine the environment more closely than usual to find beauty and ugliness.

ACTIVITY: Explain to pupils that the class will be going outside for 10 minutes. While outside, each pupil is to look around very carefully and decide what is the most beautiful and the ugliest thing he can see.

Upon returning to class, ask each pupil to draw (with charcoal, crayon, or some other media) on a large piece of paper, his perception of the two things he has selected.

Ask each pupil to explain his choices.

How many of the things selected are natural? How many are man-made? If one type predominates, involve the children in explaining why.

LEVEL: 4-6

SUBJECT: Fine Arts
Social Studies

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To understand more fully how man's securing of food from his environment has changed since primitive times.

REFERENCE: Environmental Education--A Teacher's Guide with Inquiry and Value Seeking Strategies, Santee School District, Santee, California 92071.

ACTIVITY: Divide the class into three groups and assign to each group the responsibility of dramatizing, through role playing, how man secured his food in primitive times (hunting), colonial times (simple agriculture), and modern times (highly specialized, mechanized agriculture).

Have each group create a mural or frieze to show a typical variety of activities engaged in by a sizeable group of people in their respective times. Clearly the modern times group should show a much wider range of work and recreational activities with much mechanization evident.

G R A D E L E V E L 7 - 9

Activities	
Science	11
Science-Social Studies	5
Science-Fine Arts	1
Mathematics	2
Mathematics-Science	2
Social Studies	9
Social Studies-Science	5
Social Studies-Mathematics	4
Social Studies-Fine Arts	1
Language Arts	1
Language Arts-Social Studies	1
Language Arts-Fine Arts	1
Fine Arts	1

LEVEL: 7-9

SUBJECT: Science

PROBLEM AREA: I-5 Aesthetic Considerations - Noise

CONCEPT: II-2 The relationships between man and the natural environment are mediated by his culture.

PURPOSE: To understand how man's sense of hearing is related to his living conditions.

REFERENCE: Man and His Environment
National Education Association

ACTIVITY: Secure from some source such as The Indiana University Audio-Visual Center, Bloomington, Indiana 47401, the film "Noise - The New Pollutant".

Show the film which compares the hearing ability of Americans who are subjected daily to many loud sounds and the acute hearing of peoples living in remote regions of Africa.

Follow the film showing with discussion on the importance of good hearing.

Is loud rock music a good idea? Why, or why not?
How can we reduce noise level in our country?
Is legislation or education the answer?
What can be done in our homes or schools?

LEVEL: 4-6
7-9

SUBJECT: Science

PROBLEM AREA: I-4 Aesthetic Considerations - Litter

CONCEPT: IV-5 Increasing human populations, rising levels of living, and the resultant demands for greater industrial and agricultural productivity promotes increasing environmental contamination.

PURPOSE: To understand more fully the meaning of the term biodegradable and its importance in sanitary landfill operations.

REFERENCE: Teacher Manual, Senior High Idea I-Land Environmental Education Project, Box 122, Grafton, Illinois.

ACTIVITY: Working in pairs or small groups select one item commonly put into garbage cans and subsequently into the city landfill. Typical items might be paper towel, glossy magazine cover paper, facial tissue, cardboard, saran wrap, hard plastic, rubber, food item, tin can, and aluminum foil. The several groups in class should select a different item to work with. Have the group cut four strips, about one by three inches in size, of the item selected and bury the four strips separately in garden soil in a tray, milk carton, or other suitable container. Keep the soil moist and remove one strip at weekly or biweekly intervals. Examine for evidence of "decay". Record the class data on a large master chart and discuss the observed rates and extent of disintegration. What substances appear to be appropriate for landfills? What substances should not be buried in such operations? Why?

LEVEL: 4-6
7-9

SUBJECT: Science

PROBLEM AREA: II Health Considerations

CONCEPT: I-b Living things are interdependent with one another and their environment.

PURPOSE: To become aware of the possibility that very high levels of sound may hurt plants.

REFERENCE: Environmental Education -- A Teachers' Guide with Inquiry and Value Seeking Strategies. Santee School District, Santee, California. 92071

ACTIVITY: Obtain three similar potted plants such as geraniums and place two near a sound source such as record or tape players with high volume potential. (A sound proof music room, if available, would be useful in the experiment.)

Play recorded sound at very high level to the two experimental plants for some specified period such as one hour per day. Record on a chart or log the length of time per day, the number of days, and the condition of the exposed plants compared with the control one. Observe for change in texture or firmness of plant, leaf color, and flower color as the experiment progresses.

Discuss implications of results for human beings or other animals.

LEVEL: 7-9
10-12

SUBJECT: Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To provide a method by which students will recognize individual animal tracks when encountered in the field.

REFERENCE: "Teachers Curriculum Guide for Field Ecology," Center for Environmental Education, Brevard County Schools, Cocoa, Florida 32922.

ACTIVITY: Casting Animal Tracks

Materials: forceps, plaster of Paris, poster board strips two inches wide of various lengths, india ink, small brushes, spray can of shellac.

Procedure: After locating the animal tracks, follow the procedure below:

1. Clean track of all debris, spray track with shellac or plastic.
2. Form poster board circle around print and press into ground to create a pouring form (Fig. 1).
3. Make certain that there is at least one inch of poster board above the surface.
4. Mix plaster of Paris to the thickness of pancake batter.
5. Pour the mold full of the mixture. Allow it to harden before lifting out of track (Fig. 2).
6. Clean surface of cast and coat with vaseline.
7. Form mold around cast and pour mixture until level with top of mold. If the track case is to be hung on a wall, place wire loop in surface of mixture. Let harden at least two hours (Fig. 3).
8. Remove mold and separate the two layers; wipe vaseline from cast (Fig. 4).
9. Scrape and wash cast - smooth with fine sand paper.
10. When thoroughly dry, paint inside of track with india ink and label.

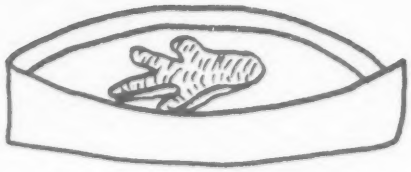
Fig. 1

Pour this mold full of plaster mix.

Fig. 2

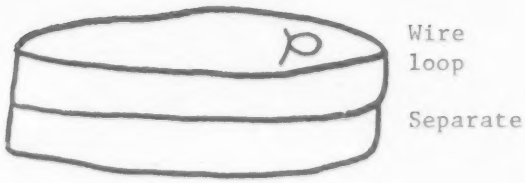
Plaster Cast

Fig. 3



Poster board mold around first cast-coat cast with vaseline.

Fig. 4



Remove mold around the two layers of casts and separate at joint.

LEVEL: 4-6
7-9

SUBJECT: Science

PROBLEM AREA: IV-12 Eco-Community Relationships - Humans

CONCEPT: IV-4 Man has been a factor affecting plant and animal succession and environmental processes.

PURPOSE: To understand the relationship between compactness of soil and water infiltration rate.

REFERENCE: "Compactness Measurement" and "Water Infiltration Rate" units in Exploring the World, An Environmental Handbook prepared for School District #2, Billings, Montana.

ACTIVITY: Divide the class into groups of three and provide each group with a sharpened on one end dowel rod about 10 inches or 25 cm. long. Each group should also have a tin can such as a #5 fruit juice can with both top and bottom removed and the bead or lip cut off of one end so it can be pushed easily into the ground. Each group should also have a quart or liter measuring container and a watch with a second hand.

Ask each group to test the soil compactness in several different places near the school, playground, or other open area that is available. This can be done by pushing the sharpened end of the dowel rod into the ground by exerting as much force as possible with the flat palm of the hand (until threshhold of pain is reached). Record how far the dowel rod can be pushed in at each site measured.

At each site twist the can into the soil (sharp edge down) until it gets through surface vegetation or litter into the actual soil. Pour into the can one liter or quart of water and record the time it takes for the water to soak in completely. Data sheets such as the following might be useful. (See page 2)

Involve the class in considering the relationship between compactness and infiltration rate. How does soil get compacted? What type soil erodes more rapidly? Why? Is it important that water soak-in rather than run-off? Why?

Compactness of Soil

Data Sheet (State unit of measurement)

Location of test	Partner #1	Partner #2
In a dirt pathway		
In a lawn		
Under a bush		
In a dirt road		

Water Infiltration

Data Sheet

Location and Description	Amount of water	Starting Time	Ending Time	Total Time	Time per Liter or Quart
Station #1					
Station #2					
Station #3					
Station #4					

LEVEL: K-3
4-6
7-9

SUBJECT: Science

PROBLEM AREA: IV-12 Eco-Community Relationships - Humans
I-4 Aesthetic Considerations - Litter

CONCEPT: III-3 Environmental management involves the application of knowledge from many different disciplines.

PURPOSE: Students will be able to observe directly the different kinds of waste created in their own school environment. Students will think of ways to solve some of these problems.

ACTIVITY: Waste Watching

Collect the waste baskets in your room or in several rooms (for any time period). Have the students divide the contents into groups of similar material. Let the students devise their own classification system.

Suggestions for classification systems:

Younger children: colors, shapes, sizes, smells, hardness, softness.

Others: plastics, metals, paper, organic, inorganic, biodegradable, non-biodegradable, renewable resource, non-renewable resource.

A chart may be developed collectively or individually. Following the sorting, the following questions might be appropriate:

What is a waste basket? What is waste?
How much waste is here?
How many hours or days of waste are here?
Where will it all go?
What can we do to cut down on waste?
How can we use some of this waste right now?
(Build a sculpture, reuse scrap paper, make collages, make flower planters out of plastic containers and cans.)

Additional follow-up activities:

Trace the manufacture of one or more of the things thrown away. Example: How paper or plastic is made.
Put up a chart so students can record what waste they can reuse at home and what new ideas for re-using waste at school.

Do some experiments using aquariums. Fill one with soil, one with water, and one with air. Put in some of the waste. Observe what happens. How many days does it take to change? Describe it. Add some water to all aquariums then add soil - repeat the above questions.

Take a trip to the school incinerators - what happens here? How often is it used? What kind of anti-pollution filter is used?

Write to a manufacturer of plastics, cans, paper or other material to find out what they are doing to recycle or reuse their product.

LEVEL: 4-6
7-9

SUBJECT: Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To involve children in becoming more aware of the amount and variety of plant and animal life found in a vacant lot.

REFERENCE: Vacant Lot Studies - an Environmental Investigation, National Wildlife Federation and Minnesota Environmental Sciences Foundation, Inc.

ACTIVITY: After securing permission for a class to study a vacant lot, divide the class into teams of 3-5 and involve the teams in carefully staking out 12 feet square plots which they will study.

Each team can inventory the litter found in its plot and try to determine what effect this litter is having on plant and animal life. They may find, for example, that certain types of litter encourage or discourage growth of plants or animals.

Each team can examine its plot for signs of animal life such as burrows, tracks, or droppings. What kinds of animals live there? Why? Is any evidence found that indicates some animals are preying on some others?

Each team can inventory the kinds of plant life found in its plot. Samples can be brought into the classroom and the children can develop their own plant key to be used by all teams in locating in their plot and subsequently on a large map of the vacant lot the most prominent types of plant life. The class may choose to discuss questions such as why certain plants are found where they are. What accounts for differences found in the same plant type? Are certain animals generally found around certain plants? Why?

LEVEL: 4-6
7-9

SUBJECT: Science

PROBLEM AREA: IV-11 Eco-Community Relationships - Water Quality

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To develop understanding of the relationship between temperature and metabolic rate.

REFERENCE: Fish and Water Temperature - an Environmental Investigation, National Wildlife Federation and Minnesota Environmental Sciences Foundation, Inc.

ACTIVITY: Organize the class into working teams of two or three students. Secure enough goldfish to provide two for each team. Half of the goldfish should be kept overnight at room temperature in an aerated aquarium to about 44° F or 7° C.

Provide each team with a small transparent container in which fish behavior can be observed. Observe a warm fish in its temperature water and count gill movements per minute. Take several readings to arrive at a good average figure.

Each group should then observe a cold fish in its temperature water and record respiration rate.

Collect data from every group into a large chart or matrix and analyze its significance. Graph the data to determine the rate that would be expected for a temperature between the two you have used. Involve the class in designing an experiment to check-out this prediction.

Discuss whether the findings with goldfish could be generalized to other animals. Can they offer proof based on their own experience?

LEVEL: 7-9
10-12

SUBJECT: Science

PROBLEM AREA: IV-11 Eco-Community Relationships - Water Quality

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To develop understanding about the relationships between quality of water and the number and kind of organisms found in different samples of water.

REFERENCE: "Aquatic Ecology Unit" in Exploring the World. An Environmental Handbook prepared for School District #2, Billings, Montana.

ACTIVITY: Divide the class into groups of 2-4. Each group should obtain a one-gallon wide mouth jar and fill it with pond or stream water known to contain some "little critters". Each group should try to use a different source. The jar should contain 1-2 cm. of ooze taken at the same point as the water sample.

Over a period of several weeks each group makes macroscopic and microscopic counts twice a week of the organisms found in its jar. With the aid of a key each group should identify type and estimate number of organisms such as protozoa, hydra, rotifers, nematodes, diptera, and capepod. Through careful recording of data differences between samples and differences within a sample over a period of time will be noted. Involve students in explaining the differences and in speculating about the relationship between these organisms and others such as fish and fish-eating animals.

LEVEL: 7-9
10-12

SUBJECT: Science

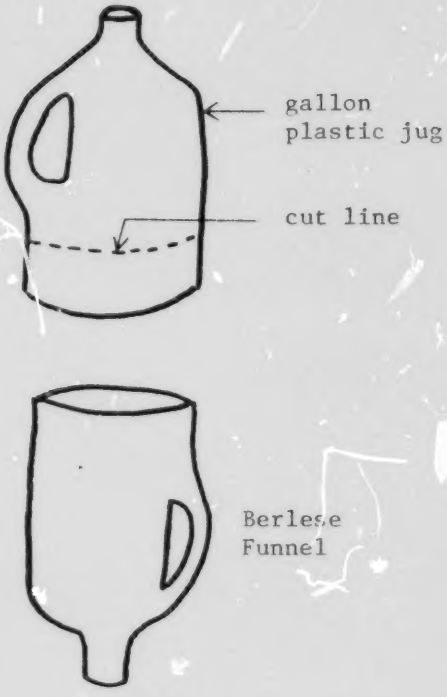
PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

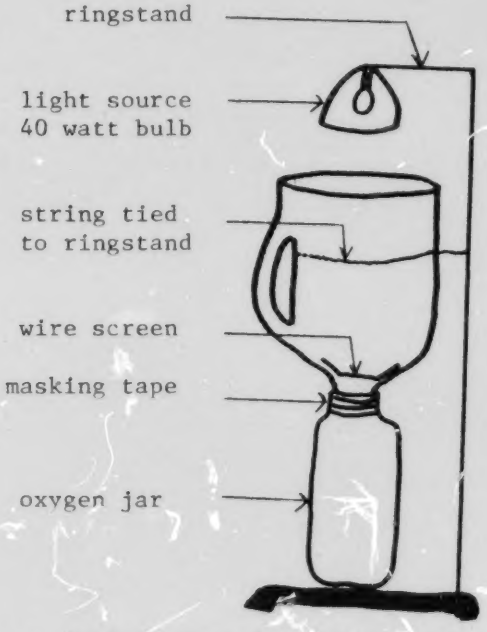
CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: In order to determine the number and kinds of macro-organisms found in the soil, a Berlese funnel may be constructed for use in collecting these organisms. Using a light bulb as a source of heat, the organisms are driven away from the heat through the Berlese funnel into a collecting jar (oxygen jar). A wire screen is used to hold the soil in the funnel; the size of the screen mesh will determine which organisms can pass through. Once the organisms are collected, the diverse life forms in the soil can be observed.

REFERENCE: "Teachers Curriculum Guide for Field Ecology," Center for Environmental Education, Brevard County Schools, Cocoa, Florida, 32922.

ACTIVITY: Constructing a Berlese Funnel





Berlese Funnel and Apparatus

LEVEL: 7-9
10-12

SUBJECT: Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To allow students to conduct scientifically controlled experiments to collect data and to construct hypotheses. To show the movement of materials within an ecosystem and the soil of certain organisms in this movement.

REFERENCE: "Tree Litter to Sow Bug Litter", Minnesota Environmental Education Committee, 350 Centennial Office Building, St. Paul, Minnesota 55155.

ACTIVITY: Sow bugs are crustaceans that live in cool, dark, moist places in forest ecosystems. During the fall and spring, students should be able to collect a large number of these by looking under logs, stones, branch and leaf litter in wooded areas.

This activity is designed to show that sow bugs contribute to the forest litter by digesting leaves and by producing litter of their own in the form of droppings and their own dead bodies. It also can be shown that sow bugs have a preference for certain types of leaves and that they can digest some leaves quicker than others.

Collect several leaves of varying kinds (beech, oak, maple, pine, etc.) and place each kind in a closed container with several (8-10) sow bugs. Plastic bags filled with air make excellent containers. There should be plenty of moisture in each container; if plastic bags are used, the air supply may need to be renewed daily. Do not keep the containers in the direct sun.

Have each student keep a record of changes in sow bugs (number, size), number of days taken to completely eat the leaves, type of leaves used, etc. After several days of observation and data collection, compile the class's data and have each student construct hypotheses on sow bug behavior based on the data collected.

LEVEL: 7-9

SUBJECT: Science
Social Studies

PROBLEM AREA: IV-4 Eco-Community Relationships - Energy Production

CONCEPT: II-3 Natural resources affect and are affected by the material welfare of a culture and directly or indirectly by philosophy, religion, government, and the arts.

PURPOSE: To become more fully aware of the many ways we use electricity in our homes, the extent of this use, the cost of this energy, and some of the problems related to our pattern of extravagant use of electricity.

REFERENCE: "Using Electricity", Mini-unit prepared by State Department of Education, St. Paul, Minnesota 55101.

ACTIVITY: Assign each student the responsibility to go through each room in his home and identify every item that uses electricity. Categorize the items under headings such as (1) light, (2) heat, (3) communication, (4) work, and (5) miscellaneous. When students bring their data to class the next day have each one group his items into (1) necessity, (2) luxury, or (3) debatable. Have several share their lists with the class giving special attention to the debatable items. Distribute worksheets that will help students learn how to read their electric meters. Assign the task of taking a reading that night and a week later. Calculate the amount of power used and compare that to horsepower (1 KWH = ?HP). Have a "fun" discussion on the advantages of using electricity rather than horses for power. Can students suggest any disadvantages?

LEVEL: 7-9

SUBJECT: Science
Social Studies

PROBLEM AREA: IV-3 Eco-Community Relationships - Natural Resource Use

CONCEPT: III-1 The management of natural resources to meet the needs of successive generations demands long-range planning.

PURPOSE: To understand the differences in natural resource use in different countries found on planet Earth.

REFERENCE: Environmental Education Instructional Activities for Grades 7-12, New York State Educational Department.

ACTIVITY: Divide the class into groups of 2-4 students. Ask each group to select a "have" or "have not" country (J.S.A., West Germany, Argentina, etc. vs. India, Libya, Peru, etc.). Using information secured from the United Nations or other reference sources, ascertain the average daily caloric intake of people in "your" country. Get information, if possible, also about that country's use of petroleum, clothing, and recreational activities.

Place information secured on a large outline map of the world and discuss the causes of the enormous variation. What countries are below recommended levels? Are any above? Why? What responsibility, if any, should the "haves" assume for the "have nots"?

LEVEL: 7-9
10-12

SUBJECT: Science
Social Studies

PROBLEM AREA: IV-12 Eco-Community Relationships - Humans

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To understand the continuous recycling process of nature and to see how man himself is a major interfering factor in this process.

REFERENCE: Environmental Educational Instructional Activities for Grades 7-12, New York State Education Department.

ACTIVITY: Review with students the cycle by which animal wastes and dead animals and plants revert back to the soil where they are available for future plant and subsequent animal use.

Through questioning help students understand how man's wastes and dead bodies are, in the U.S.A., notable exceptions to the general cycle. Get students to estimate the amount of organic material man takes from the soil which he flushes into rivers or other bodies of water. Is this material "lost"? What happens to it? Does it return to the soil? Who, if anyone, should be concerned about this problem? What practical answers can students suggest?

LEVEL: 4-6
7-9

SUBJECT: Science
Social Studies

PROBLEM AREA: IV-3 Eco-Community Relationships - Natural Resource Use

CONCEPT: III-1 The management of natural resources to meet the needs of successive generations demands long-range planning.

PURPOSE: To develop an understanding of the natural resources involved in maintaining current consumption patterns in the United States and to develop further understanding of growing demands and competing uses for natural resources as more countries become industrialized and attempt to raise the standards of living of their people.

REFERENCE: Environmental Quality and The Citizen, Clausen and Iverson, Soil Conservation Society of America.

ACTIVITY: Have each class member list the renewable and non-renewable resources he or she has consumed in the past 24 hours and identify each as essential to survival, necessary for maintenance of life style, or luxury. List alternatives that would reduce waste of non-renewable resources.

Compile a master list of student responses and discuss interesting data that is produced.

LEVEL: 4-6
7-9

SUBJECT: Science
Social Studies

PROBLEM AREA: IV-9 Eco-Community Relationships - Fertilizers and Pesticides.

CONCEPT: IV-4 Man has been a factor affecting plant and animal succession and environmental processes.

PURPOSE: To understand how compost can be made and to appreciate the potential of composting as a garbage disposal and soil-enriching process

REFERENCE: Teacher Manual, Junior High Idea 1 - Land, Environmental Education Project, Box 122, Grafton, Illinois.

ACTIVITY: After some exploratory discussion on the value of composting, invite an agricultural specialist, avid organic gardener, or similar knowledgeable person to come to the class and discuss his experiences with compost making and to respond to student questions. Ask him to furnish each class member with a handout or simple bulletin on building compost piles.

Secure permission and support from the school administration to build a compost pile of appropriate size on the school site and have the class compost some of the materials now disposed of in other ways.

Use the compost to fertilize flower beds, shrubs, and other plantings on the school grounds.

Urge children, if feasible, to involve parents in a similar project at home.

LEVEL: 4-6
7-9
10-12

SUBJECT: Science
Fine Arts

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

I-2 Green plants are the ultimate sources of food, clothing, shelter, and energy in most societies.

PURPOSE. Students will construct a food pyramid to observe the complexity of relationships and maintenance of them. This activity is designed to incorporate psychomotor skills in the construction of a food pyramid so that the student may become aware of the relationships and balances involved in food chains. Skills in levers and balances concepts are also involved.

ACTIVITY: Food Pyramid Mobile

Materials: pictures of organisms (producers, consumers, and decomposers), wire (straws, wood), string, scissors (optional), glue (optional).

Procedure: Students are to construct a mobile which represents a simple food chain (pyramid) based upon their understanding of food pyramids and the ecosystem. Materials should be made available for students to use as they wish in accomplishing the objective.

Conclusions:

As you observe your mobile from top to its base, what is the relationship of numbers of organisms to place in the mobile?

Where are the producers in your mobile?

Where are the primary consumers in your mobile?

Where are the other consumers in your mobile?

What happens to your mobile when you remove one of the producers?

What happens when you remove a whole set of producers from the mobile?

What is the final consumer of your mobile?

What other organisms could be at the "top" of the mobile?

LEVEL: 7-9

SUBJECT: Mathematics

PROBLEM AREA: IV-6 Eco-Community Relationships - Population Studies

CONCEPT: IV-5 Increasing human populations, rising levels of living, and the resultant demands for greater industrial and agricultural productivity promotes increasing environmental contamination.

PURPOSE: To compare the population growth rate of a specific city, town, or area with the national or world-wide rate of growth. Data obtained from national census or international organizations such as the United Nations can be secured and contrasted with more personalized data secured from local newspapers over short periods of time.

REFERENCE: Investigations in Ecology by Schultz and Marcuccio, Charles E. Merrill Publishing Company, Columbus, Ohio, 1972.

ACTIVITY: Compare for a week or more the daily births and deaths for your area. These may be obtained from daily or weekly newspapers or, in large cities, from a legal newspaper.

Prepare a table of data showing daily and cumulative births and deaths for the time of your investigation. Construct line graphs which show the increases from day to day and the differences, if any, between males and females.

Is your area having a natural increase in population? How does it compare with other areas? Is there a difference between male and female population growth? What will the rate of growth mean to your city or area if continued for 25, 50, or 100 years?

LEVEL: 7-9

SUBJECT: Mathematics

PROBLEM AREA: IV-3 Eco-Community Relationships - Natural Resource Use

CONCEPT: II-3 Natural resources affect and are affected by the material welfare of a culture.

PURPOSE: To acquire some understanding of the tremendous amounts of copper and aluminum used to transmit electricity in an area or city.

REFERENCE: Mathematics and the Study of the Environment, Environmental Education Section of Alaska Department of Education.

ACTIVITY: Secure from the power company small samples of the different sizes of wire used to transmit power in the area. Also secure (2-3 students could do this) information about where the different sizes are used.

Involve students in determining the weight per unit length (use both English and metric systems) and in getting rough measures of the lengths of transmission wires found in various areas of the community or city. Calculate weight of copper and aluminum used and then extrapolate to estimate the amount used by larger areas or populations.

Discuss briefly some problems of diminishing copper resources and the need for recycling such materials.

LEVEL: 4-6
7-9

SUBJECT: Mathematics
Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-4 In any environment, one component like space, water, air, or food may become a limiting factor.

PURPOSE: To acquire understanding about the effect of paving, sidewalks, and buildings on water run-off including flooding and sewage systems. To compare water run-off between city and rural land.

REFERENCE: Investigations in Ecology, Schultz and Marcuccio, Charles E. Merrill, Columbus, Ohio, 1972.

ACTIVITY: Calculate the area of the school site covered by impervious material. Calculate also the area covered by vegetation which will absorb most rainfall and other areas that may absorb a smaller percentage.

Secure data from the weather bureau regarding normal annual rainfall for your area. Calculate in various units (gallons, tons, liters, kilograms) the run-off for a year.

Extend the calculations to cover a square mile of a city.

Is it important that rainfall "soak into the ground"? Why or why not?
Why are cities likely to have flood damage after a very heavy rain?
What purpose is served by storm sewers? Does your city have them?

LEVEL: 4-6
7-9

SUBJECT: Mathematics
Science

PROBLEM AREA: IV-1, 6 Eco-Community Relationships - Ecological Considerations; Population Studies

CONCEPT: I-3 An organism is the product of its heredity and environment.

PURPOSE: This activity allows the student to develop skills in constructing and interpreting graphs. Using personal data, the student collects raw data, combines the data, and draws conclusions regarding similarity and variation within the human species. Skills in using weights and measurements are used and reinforced.

REFERENCE: Fundamentals for Understanding Environmental Problems; Environmental Education Project, Topeka Public and Parochial Schools; 1601 Van Buren; Topeka, Kansas 66612.

ACTIVITY: Collecting Data and Constructing Graphs

Working in pairs, have each student collect personal information about his partner, such as height, weight, length of index finger, eye level, walking pace, reach, eye color, handspan, etc. Collect this information on a data sheet and have each student cut his data sheet in strips so each measurement is on a separate strip. Group all data from one measurement (e.g. height) together. Assign each type of measurement to student groups of two or three; have each student group construct a graph based on the data that group has on a particular characteristic. Label the base of the graph with the characteristic (e.g. height), and place frequency numbers up the left side.

After graphing the data, aid the students in understanding variation and similarity by considering such questions as the following:

What shape does the graph follow?
What is the average for each graph?
Is it possible to state that all students in class are ____ inches tall?

This concept can be further developed by considering other variations in other organisms; what causes variations; the advantages and disadvantages of some variations.

LEVEL: 7-9

SUBJECT: Social Studies

PROBLEM AREA: I-11 Aesthetic Considerations - Recreation Facilities

CONCEPT: II-1 The culture of a group is its learned behavior in the form of customs, habits, attitudes, institutions, and lifeways that are transmitted to its progeny.

PURPOSE: To make students more aware of the natural recreational opportunities provided at public expense in the community and/or state.

REFERENCE: Environmental Educational Instructional Activities for Grades 7-12, New York State Education Department.

ACTIVITY: Have the students prepare a list of local and state owned recreation areas. Secure detailed information on many of the areas listed by writing to the State Department of Natural Resources or comparable division for maps and descriptive literature. Make a large bulletin board display of the materials collected along with brief summaries of interesting places to enjoy which can be dittoed into a simple booklet and taken home to parents.

If possible arrange for a class field trip to one of the areas located that few students have previously visited. Discuss the things learned about the area and what the state or community is doing to maintain it.

LEVEL: 7-9

SUBJECT: Social Studies

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To understand more fully how some aspects of our technological culture contribute to environmental degradation.

REFERENCE: Social Studies Resource Units, Brevard (Fla.) County Schools

ACTIVITY: Place the following quotation by Richard Armour on the board and let students react to it -- "Give us this day our daily bread, free of cadmium, mercury, and lead".

Show films such as 'The Silent Spring of Rachel Carson" and/or filmstrips which depict degradation of our environment. After discussion of the filmed materials, have students draw cartoons that depict examples of air, water, land, or other pollution. Display selected cartoons on classroom walls or in school showcases.

LEVEL: 7-9

SUBJECT: Social Studies

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To understand the good and bad effects resulting from industries located in a community.

REFERENCE: All Around You - An Environmental Study Guide, U.S. Dept. of Interior, Bureau of Land Management.

ACTIVITY: Review with the class reasons for the mass movement of people to cities in this century. Emphasize the importance of "jobs" -- going where labor is needed.

Develop with the class a list of the major industries in your town or city. If several or many industries are identified, divide the class into small work groups with the assignment of researching questions such as how many people in the community depend on a specific industry for their living. Why did the industry locate in that particular place? What were (are) some of the good and bad effects of the industry on land, air, water, animals, the town, their family?

Share group findings through reports and class discussion.

LEVEL: 7-9
10-12

SUBJECT: Social Studies

PROBLEM AREA: V-2 Psychological and Behavioral Considerations - Social Aspects

CONCEPT: II-2 The relationships between man and the natural environment are mediated by his culture.

III-1 The management of natural resources to meet the needs of successive generations demands long-range planning.

PURPOSE: To determine the awareness of the citizenry of your community to the pollution problem and to determine their willingness to play a role in some solutions to the problem.

Man's survival depends a great deal upon the consumer's becoming aware of the pollution problem and some possible solutions. In this exercise you will have an opportunity to determine how much the average citizen knows about the nature of some of the pollution problems and how willing he is to do something about it.

REFERENCE: Teachers Curriculum Guide for Field Ecology. Center for Environmental Education; Brevard County Schools; Cocoa, Florida 32922.

ACTIVITY: Community Attitudes Survey

The basic tool of this exercise is the questionnaire. Each student should survey his neighborhood using the attached questionnaire and recording the answers as to:

Adults (21 years and above)
Young People (20 years or below)

This data should be compiled by class on charts on the board.

From the totals on the board, compute the percentages of YES - NO - MAYBE for each question according to the two divisions:

$$\frac{\text{Total \# answering (YES) (NO) or (MAYBE)}}{\text{Total \# answering the questions}} \times 100$$

From a study of the percentages, try to determine any clear cut differences of opinion between the two groups on any or all of the questions. If any exist, state them.

If any differences of opinion occur between the groups surveyed, attempt to explain why the difference may exist.

From your analysis of the data and your discussion, attempt to make an overall statement of the results of your survey.

ECOLOGY SURVEY

	YES	NO	MAYBE
1. Would you be willing to purchase returnable soft drink and beer containers to the exclusion of no deposit-no return? (Plastic and glass)	____	____	____
2. Would you be willing to limit your purchase to "no phosphate" detergents until an acceptable substitute is found?	____	____	____
3. Would you be willing to vote for bond issues to construct efficient sewage disposal systems? (This means an increase in taxes!)	____	____	____
4. Would you like to see more of our "natural wilderness" area set aside just for the sake of preservation for future generations?	____	____	____
5. Would you be willing to accept a lower quality fruit and vegetable at your local supermarket at the expense of a marked reduction in the use of pesticides by the growers?	____	____	____
6. Would you be willing to sort paper wastes each week (newspaper, magazines, and others) in order to facilitate ease of pickup for recycling? (This means tying up the bundles.)	____	____	____
7. Would you be willing to pay higher prices for products so that industries can install pollution control devices which would eliminate or reduce pollution of air, land, and water? (Do you really think the industries will absorb the costs without passing it to you - the consumer?)	____	____	____
8. Would you be willing to reduce or eliminate as many of your paper products as possible by doing the following:			
A. Use sponge or cloth instead of paper towels?	____	____	____
B. Use washable diapers, not disposable?	____	____	____
C. Use washable glasses and plates instead of disposable ones?	____	____	____
D. Use cloth napkins instead of paper?	____	____	____
9. DO NOT LITTER! This is the easiest pollution to stop.	____	____	____

LEVEL: 4-6
7-9

SUBJECT: Social Studies

PROBLEM AREA: IV Eco-Community Relationships - Ecological Considerations

CONCEPT: II-3 Natural resources affect and are affected by the material welfare of a culture and directly or indirectly by philosophy, religion, government and the arts.

PURPOSE: To become aware of special interest groups that are working to preserve the natural environment and to promote fulier understanding of what is meant by "the balance of nature".

REFERENCE: Social Studies Resource Units. Brevard (Fla.) County Schools; Cocoa, Florida.

ACTIVITY: Invite a representative of a local conservation group (Audubon Society, Sierra Club, Izaak Walton League, etc.) or appropriate government agency to class to be interviewed by students.

Involve the entire class in composing key questions which will be used by four students in a "Meet the Press" type of interview with the resource person. Also provide the time for other class members to ask questions spontaneously.

Attempt to reach a class conclusion regarding the importance of such groups.

LEVEL: 7-9
10-12

SUBJECT: Social Studies

PROBLEM AREA: I-11 Aesthetic Considerations - Recreational Facilities

CONCEPT: III-1 The management of natural resources to meet the needs of successive generations demands long-range planning.

PURPOSE: To understand that short term economic gains and immediate personal satisfactions sometimes conflict with long-term environmental benefits.

REFERENCE: Environmental Educational Instructional Activities for Grades 7-12, New York State Education Department

ACTIVITY: Use geologic and road maps to locate, if possible, an area of the state that might be proposed as a "forever wild" site. Another possibility would be to identify and locate areas such as the Everglades or the Cascade National Park which have been supported recently as wilderness areas.

Divide the class into two groups -- one group advocating and defending the creation of the wilderness area; another opposing it. Suggest that attention be given to as many as possible of the groups interested in such areas -- motel operators, restaurant owners, gasoline dealers, guides, lumber companies, campers, backpackers, automobile sightseers, etc.

Suggest the two groups discuss the value of wilderness areas versus the value of commercial development of the areas. How "wild" should the area be? Should snow-mobiles and motorbikes be prohibited? Why or why not?

LEVEL: 7-9
10-12

SUBJECT: Social Studies

PROBLEM AREA: V-2 Psychological and Behavioral Considerations - Social Aspects

CONCEPT: IV-4 Man has been a factor affecting plant and animal succession and environmental processes.

PURPOSE: To understand the man-made changes which have occurred in a specific locality, to distinguish between planned or unplanned and helpful or harmful changes.

REFERENCE: Environmental Education Instructional Activities for Grades 7-12, New York State Education Department.

ACTIVITY: Divide the class into four groups for the purpose of collecting data from town records or other sources on general land use of the community today, 25, 50, and 100 years ago. Show the changing pattern of use on basic outline maps. Interview some residents who have lived in the community for 25 or 50 years to get their perceptions of the changes that occurred.

In discussion try to determine the changes that were helpful or harmful. What could have been done to prevent the harmful changes? What changes appear to be coming? Will some of them be harmful? If so, how might they be minimized or prevented?

LEVEL: 7-9
10-12

SUBJECT: Social Studies

PROBLEM AREA: IV-3 Eco-Community Relationships - Natural Resource Use

CONCEPT: III-4 Management is the result of technical and scientific knowledge being applied in a rational direction to achieve a particular objective.

PURPOSE: To understand the relationships between our rising standards of living and the increasing costs (shortages) of some natural resources.

REFERENCE: Environmental Educational Instructional Activities for Grades 7-12, New York State Education Department.

ACTIVITY: With student help develop a list of industries that use tremendous amounts of natural resources. Students will cite such examples as automobile (steel, rubber, copper, lead, etc.) petroleum, electronics, chemical, newsprint, etc. Assign individuals or small groups the task of determining the increasing use of a material such as petroleum, rubber, or paper during the last 50 years or so. If possible, develop graphs to project anticipated amount required 50 years in the future. Discuss such things as the possibilities of new discoveries but within a finite system. Do we waste resources? What is "planned obsolescence"? Who profits from it? Who should establish priorities for resource use? Is it possible or desirable to have "prosperity" without an expanding economy?

LEVEL: 4-6
7-9

SUBJECT: Social Studies

PROBLEM AREA: IV-3 Eco-Community Relationships - Natural Resource Use

CONCEPT: III-1 The management of natural resources to meet the needs of successive generations demands long-range planning.

PURPOSE: To understand that natural resources are unequally distributed in terms of land areas and political boundaries and that use or misuse of such resources is becoming a matter of world-wide concern.

REFERENCE: Environmental Educational Instructional Activities for Grades K-6, New York State Education Department

ACTIVITY: Develop with the students a list of all the major raw materials needed to build an automobile. Have students find the sources (countries) of these materials. On a large outline map of the world which the children have prepared locate Detroit, the sources of the raw materials with a small hand-made flag of that country, and connect them with colored yarn or thread.

Through discussion examine questions such as: How many countries contribute to a car "made in U.S.A."? What raw materials needed are in short or plentiful supply? What has happened to the growth in automobile production during the past 10-20 years? What will happen if and when other countries begin making and using as many automobiles as the U.S.A. does now?

LEVEL: 7-9

SUBJECT: Social Studies
Science

PROBLEM AREA: IV-5 Eco-Community Relationships - Urban Planning

CONCEPT: III-4 Management is the result of technical and scientific knowledge being applied in a rational direction to achieve a particular objective.

PURPOSE: To understand the critical importance of technology in urban life.

REFERENCE: Environmental Education. A Teacher's Guide with Inquiry and Value Seeking Strategies. Santee School District, Santee, California 92071.

ACTIVITY: Have individual students research (including field visits if possible) and report on technological problems and developments which are unique to city living such as enormous pure water supply, waste sewage disposal systems, food processing and distribution systems, garbage disposal systems, construction of multiple dwellings, mass transportation, traffic controls, and so forth.

As students report, involve the class in considering the question of whether technology is "servant or master".

LEVEL: 7-9

SUBJECT: Social Studies
Science

PROBLEM AREA: V-2 Psychological and Behavioral Considerations - Social Aspects

CONCEPT: IV-2 The rate of change in environment may exceed the rate of organism adaptation.

PURPOSE: To understand how our environmental conditions are being changed by technology and to become aware of how technological developments have forced man to adapt new behaviors.

REFERENCE: Environmental Education. A Teacher's Guide with Inquiry and Value Seeking Strategies. Santee School District, Santee, California 92071.

ACTIVITY: Review with the class what is meant by a "jack-of-all-trades"--a valued member of society in simpler times. Elicit from the students a list of skills required today in an urban area that are very specialized such as color TV repairman, piano tuner, automatic transmission specialist and so forth. Contrast the "instant service" demanded in cities today with the more leisurely pace found in less complex cultures.

What evidence can the students cite or obtain from others such as psychiatrists or social workers to indicate people are adjusting or adapting well or poorly to more specialized and faster living.

What kinds of enhancement does city life offer? What kinds of deprivations? Has the overall change resulted in "progress"? Do we have any evidence that many people seriously want to leave the technological age and return to simpler times?

LEVEL: 7-9

SUBJECT: Social Studies
Science

PROBLEM AREA: IV-3 Eco-Community Relationships - Natural Resource Use

CONCEPT: I-4 In any environment, one component like: space, water, air, or food may become a limiting factor.

PURPOSE: To understand more fully some of the unique capacities of water and to appreciate more fully the importance of water in their community.

REFERENCE: Man and Environment for Secondary Schools, National Association for Environmental Education; P.O. Box 1295; Miami, Florida 33143.

ACTIVITY: Involve the class in listing on the chalkboard the major uses of water in their community e.g. drinking, plant growth, cooling, recreation, manufacturing, street cleaning, sewage removal, etc. Students should be asked to select one of the major uses and do some interviewing with knowledgeable people and some creative thinking to decide why water and not some other substance is used in their area of investigation. They should also be asked to report on what effect, if any, the use has on water quality in their community.

LEVEL: 7-9
10-12

SUBJECT: Social Studies
Science

PROBLEM AREA: I-6 Aesthetic Considerations - Water Quality

CONCEPT: III-3 Environmental management involves the application of knowledge from many different disciplines.

PURPOSE: To see the effects of soaps and detergents on soiled fabric. To evaluate alternative products to phosphate detergents.

These particular activities could be used in conjunction with a Home Economics unit on laundry. It should be used after discussion of soaps, detergent and their effect on the environment. It is intended for the student to evaluate attitudes on the issue.

REFERENCE: Soaps, Detergents and the Environment. . . ., The Soap and Detergent Association; 475 Park Ave. South; New York, New York 10016.

Problems with Current Phosphate Replacement Materials; Federal Trade Commission Hearing; April 26, 1971.

ACTIVITY: Dirty Detergents

Materials: Four lab teams
Each team receives: 2 quart jars (each filled with hot H_2O), 1 4" x 4" square of soiled fabric swatch

Procedure:

Team #1 adds 1 Tbsp. phosphate detergent to 1 qt. water
Team #2 adds 1 Tbsp. soap to 1 qt. water
Team #3 adds 1 Tbsp. soap and 1 Tbsp. washing soda to 1 qt. water
Team #4 adds 1 Tbsp. "no phosphate" detergent to 1 qt. water

After each team adds its particular soap or detergent to water, agitate the jar. Add the square of fabric. Cap the jar and shake until fabric is clean. Rinse fabric in the jar of clear water by putting fabric in the jar, capping the jar, and agitating.

Test pH level of wash water using pH paper, Hach kit, or other means.

Compare the cleanliness of fabric swatches and their respective pH levels of the washing water.

LEVEL: 7-9
10-12

SUBJECT: Social Studies
Science

PROBLEM AREA: IV-3 Eco-Community Relationships - Natural Resource Use

CONCEPT: III-1 The management of natural resources to meet the needs of successive generations demands long-range planning.

PURPOSE: To appreciate more fully the variety of building materials available and the advantages and disadvantages they offer.

REFERENCE: Environmental Educational Instructional Activities for Grades 7-12, New York State Education Department.

ACTIVITY: With input from students develop on the chalkboard a list of the major materials used for building in their locality -- wood, brick, stone, concrete, stucco, steel, aluminum, etc.

Ask 2-3 students to find examples of structures made from each material, the source of the material, and the date of construction of the building. If possible, they should also bring to class a sample of the material they are investigating.

The materials may be tested for durability against friction, heat, and water action. Estimates of costs may be obtained from parents, building contractors, or Public Works officials. The class may consider such questions as why most housing in U.S.A. is wooden but most in Europe is brick. How does climate affect building material? How can durability be increased? What do we sacrifice to provide low cost construction? Is initial low-cost the most important factor to consider? Should we change our construction industry? Why? How?

LEVEL: 7-9

SUBJECT: Social Studies
Mathematics

PROBLEM AREA: IV-3 Eco-Community Relationships - Natural Resource Use

CONCEPT: II-1 The culture of a group is its learned behavior in the form of customs, habits, attitudes, institutions, and lifeways that are transmitted to its progeny.

PURPOSE: To become more aware of the enormous amount of material used in packaging items for sale in typical supermarkets.

REFERENCE: Environmental Education Section of Alaska Department of Education.

ACTIVITY: Divide the class into groups of three or four students. Assign them to visit different supermarkets near the school or to do their investigation in different areas of one store. Each group should collect data on the different types or kinds of packaging materials used. They should also calculate or estimate as carefully as they can the weight of packaging material used for one type of commodity (soap powder, fruit juice, milk, meat, vegetables, etc.). Estimate, also, the amount or weight of this packaging material carried from the supermarket in a complete turnover of stock which is now on the shelves. Expand the calculations to a larger unit such as a city.

After sharing data secured in the classroom involve the class in discussion pointed toward examining the advantages and disadvantages of our present consumer packaging practices. What recommendations would the class like to offer to manufacturers? Supermarket operators? Consumers? Government agencies?

LEVEL: 7-9

SUBJECT: Social Studies
Mathematics

PROBLEM AREA: IV-2 Eco-Community Relationships - Land Use

CONCEPT: II-2 The relationships between man and the natural environment are mediated by his culture.

PURPOSE: Students will acquire understanding of the importance and interrelationships of the many different kinds of land usage in an urban ecosystem. They will begin to understand some of the natural and cultural forces which help determine if land is to be used for residential, industrial, agricultural, recreational or other purposes.

REFERENCE: Using the School and Community (Teachers Handbook) Nashville, Tennessee, Metro Schools.

ACTIVITY: Study closely (or make) a map of your town or city. Develop a table showing how much land is devoted to parks, shopping areas, industrial sites, etc. Explain the location of these areas in your city.

What changes would you like to see made in regard to land use in your town in the future? Why?

What agencies or offices make land use decisions that affect your town?

Does your town have zoning laws? If so, list the types and/or locate them on your city map.

Does your town have any serious problems related to land use such as major erosion, land slides, floods? Are there provisions in your town's zoning laws to deal with these problems?

LEVEL: 7-9

SUBJECT: Social Studies
Mathematics

PROBLEM AREA: IV-3 Eco-Community Relationships - Natural Resource Use

CONCEPT: I-4 In any environment, one component like: space, water, air, or food may become a limiting factor.

PURPOSE: To realize that people use huge amounts of water every day and to appreciate more fully the problems associated with providing adequate water supply to large metropolitan areas.

REFERENCE: "Environmental Education", John Towler and David Brenchley, Environmental Quarterly Magazine, May 1973, pp. 58-60.

ACTIVITY: Involve students in calculating the amount of water used daily in their (a) homes (b) community (c) state and (d) the United States--a table such as follows might be useful. Selected individuals or small groups might investigate through interviews with key personnel the availability (present and future) of water in the community using survey questions such as those also suggested below. Finally discuss the findings with the entire class to determine what they might mean to individuals, industry, government or other groups.

ESTIMATED WATER CONSUMPTION

Source	Population	Use Factor (Gal/Person/Day)	Estimated Daily Water Use (Gallons)
Home		150	
City		150	
State		150	
United States		150	
United States (All Sources)		1600	

COMMUNITY SURVEY ON WATER NEEDS

1. What is the name of the person interviewed and what is his position?

2. Where does our city get its water? Is any rainwater collected?

3. Why do we get it from this source?

4. Have we ever had a water shortage? If so, when? Why did these shortages occur?

5. What action <u>is</u> or <u>should be</u> taken during a water shortage period?

   (a) by the city:

   (b) by industries:

   (c) by individuals:

6. Are there any other sources where the city could obtain water?

7. What plans have been made to meet the future water needs of the community?

8. Is the city recycling any water? Are there any plans to do this in the future? Why or why not?

9. Does the city supply water to any large industries? If so, how many millions of gallons per day go to each industry?

10. How much water is distributed daily to the residential areas of our community?

11. How is the water distributed in our homes?

12. What is the normal water pressure in the system? How is this pressure created? What size pipes are used?

13. Do we have reservoirs and water tanks? If so, where are they? How large are they?

14. Is our water treated prior to being put into the distribution system? If so, what is done to it and why? Can you draw us a diagram of this operation?

15. Does our city have an adequate water system? How could it be improved?

16. Are there any articles or reports which we can study in more detail?

17. What is the present price-rate structure for city water? Do you have different rates for residential and industrial uses? If so, what is the difference and why is this the case?

LEVEL: 7-9
10-12

SUBJECT: Social Studies
Mathematics

PROBLEM AREA: IV Eco-Community Relationships - Humans

CONCEPT: II-1 The culture of a group is its learned behavior in the form of customs, habits, attitudes, institutions, and lifeways that are transmitted to its progeny.

PURPOSE: To obtain specific data concerning the efficiency of the privately driven automobile as a means of commuting from home to work. To sense the extent to which automobiles appear to be used for personal convenience rather than economical transportation.

REFERENCE: Investigations in Ecology by Schultz and Marcuccio, Charles E. Merrill Publishing Co., Columbus, Ohio, 1972.

ACTIVITY: During morning or evening rush hours, stand with a friend on the sidewalk along a street where commuter traffic passes. Count and record the number of people, including the driver, in each of 100 passenger cars. Record data on a tally sheet. Let one person observe and call out the information to the other person to record.

Data can be collected for the same time on different days as well as during different times of the day such as 8:00 .m., 10:00 a.m., 12:00 noon, 2:00 p.m., and 4:00 p.m. ata collected can be graphed and discussed to answer questions such as the following:

Why are there so many single-passenger cars?
How efficiently do we use energy (horsepower) to move commuters by automobile?
Why don't we use more efficient means?
hy does the pattern of car use vary from workday to weekend or during the day?

LEVEL: 7-9
10-12

SUBJECT: Social Studies
Fine Arts

PROBLEM AREA: I-7 Aesthetic Considerations - Open Space

CONCEPT: III-1 The management of natural resources to meet the needs of successive generations demands long-range planning.

PURPOSE: To become aware of the results of population pressures on popular vacation areas.

REFERENCE: Environmental Issues Conflict Unit - Teachers Guide and Student Book, Diablo Valley Education Project. Orinda, California.

ACTIVITY: Secure the film "Pave It and Paint It Green" available from EMC Sales (film #7699) or from some rental agency. Show the film and involve the class in discussing what is happening to Yosemite Valley as depicted in the film, or in Yellowstone Park, or other very popular vacation sites they know about through personal experience.

What suggestions can they offer to deal with the problem? To what extent should or must the problem be solved by individuals or by various governmental units? What responsibility are they personally willing to assume?

LEVEL: 7-9

SUBJECT: Language Arts

PROBLEM AREA: V-2 Psychological and Behavioral Considerations - Social Aspects.

CONCEPT: II-1 The culture of a group is its learned behavior in the form of customs, habits, attitudes, institutions, and lifeways that are transmitted to its progeny.

PURPOSE: To develop skill in communicating strong feelings about aspects of the environment which concern students.

REFERENCE: Environmental Studies. American Geological Institute, 1971.

ACTIVITY: Invite students to use any medium available such as tape recorder, poster, overhead transparency, or dramatized skit and create a "commercial" for some aspect of their environment. Present the "commercial" to the class for discussion and reaction.

The reference cited above suggests that students may not limit themselves to such subjects as anti-litter but may choose to be against dope, against some school rules, against some school personnel, against commercials, and so forth.

Discussion might give attention to the effectiveness of commercials, especially those observed on television.

LEVEL: 7-9
10-12

SUBJECT: Language Arts
Social Studies

PROBLEM AREA: IV-6 Eco-Community Relationships - Population Studies

CONCEPT: III-2 Family planning and the limiting of family also are important if overpopulation is to be avoided and a reasonable standard of living assured for successive generations.

PURPOSE: To involve students in thinking ahead about the impact of population growth on their lives, style and standard of living.

ACTIVITY: Read to the class short excerpts from a book such as Paul Ehrlich's The Population Bomb to dramatize the fact that many countries are growing at a rate that doubles their population every 30 years.

Ask each student to write a story, essay, poem, or other piece of creative writing in which he indicates what such growth might mean to him in the next 30 and 60 years. Suggest he may think in terms of his community, state, nation, the world or some combination of these.

Have some students read their essays or stories to the class, have students exchange writings with a classmate and react to his efforts. Finally attempt through discussion to arrive at some generalizations held by the class. What do these mean as far as our present life style is concerned?

LEVEL: 4-6
7-9
10-12

SUBJECT: Language Arts
Fine Arts

PROBLEM AREA: I Aesthetic Considerations

CONCEPT: II-2 The relationships between man and the natural environment are mediated by his culture.

PURPOSE: Students will express their feelings about a certain area by writing a haiku and drawing a finger-paint picture to accompany the feeling expressed by their haiku.

By using these two methods or forms of expression a student may search out his feelings about an object(s) and express these feelings. The student also works with two media of expression, enabling the student to be able to express himself more effectively.

ACTIVITY: What Do You See? ---- How Do You Feel?

Materials: paper, pencils, temper paints

Procedure: Students are asked to write a haiku about a certain area of his environment (the school lawn and building might be a good first attempt). After writing the haiku, the student is then asked to make a finger-paint picture using only two colors to accompany his haiku. The colors chosen by each student should help express his feelings. (For an example of what a haiku is, see below.)

Haiku is a form of expression, Japanese in origin, used to express kinship with things natural. It is written as follows:

1st line has 5 syllables	Brimming full of life
2nd line has 7 syllables	Heeding nature's starting gun
3rd line has 5 syllables	Pond explodes in spring.

Post and compare the works. Draw upon differences in interpretation and moods expressed. This can easily bring out socio-economic values and is a good discussion motivator. Use in a variety of environments such as parks, ponds, industries, landfills, etc.

LEVEL: 7-9

SUBJECT: Fine Arts

PROBLEM AREA: V-1 Psychological and Behavioral Considerations - Crowding

CONCEPT: II-3 Natural resources affect and are affected by the material welfare of a culture and directly or indirectly by philosophy, religion, government, and the arts.

PURPOSE: To understand how composers write music to illustrate some of the variety found in man's environment.

REFERENCE: Adventure in Environment. Silver Burdett Company, 1971.

ACTIVITY: The music specialist in a school can involve a class in listening carefully to a musical composition in which the composer depicts changing moods associated with natural objects.

The reference cited above suggests the use of a composition such as Smetana's "The Moldau" in which the listener is involved in following a river from its source, past a hunt, past a wedding, during a night, through a rapids, and so forth.

In such an activity, the children can recreate in their minds some of the feelings associated with running streams and can appreciate how a composer uses various instruments and other techniques to recreate these feelings.

G R A D E L E V E L 10 - 12

Activities

Science	15
Science-Social Studies	5
Science-Fine Arts	1
Mathematics-Science	1
Social Studies	16
Social Studies-Science	8
Social Studies-Mathematics	1
Social Studies-Fine Arts	1
Language Arts-Social Studies	2
Language Arts-Fine Arts	1

LEVEL: 10-12

SUBJECT: Science

PROBLEM AREA: IV-2 Eco-Community Relationships - Land Use

CONCEPT: III-4 Management is the result of technical and scientific knowledge being applied in a rational direction to achieve a particular objective.

PURPOSE: To study splash erosion on various ground covers.

REFERENCE: "Teaching Soil and Water Conservation," Soil Conservation Service, U.S. Department of Agriculture.

ACTIVITY: Make splash boards 1 inch thick, 4 inches wide, and 3-1/2 feet long; sharpen one end of each board. Paint each board white; then mark three lines across each board at one-foot intervals beginning at the unsharpened end. At the top of each board attach tin shields about 4 inches wide and 8 to 10 inches long; the shield helps to prevent the rain from washing off the splashed soil. When using the board, drive the sharpened end 6 inches into the ground so that ground level will be at the lowest mark.

The splash boards can be used to demonstrate that the impact of raindrops falling on bare soil causes soil to be eroded; this is indicated by the amount of soil which splashes onto the splash boards. Comparisons in the amou of erosion can be made between base soil and various type of ground cover by placing splash boards in bare soil, grassy areas, cultivated fields, and other types of soil or vegetation. Instead of waiting for natural precipitat to occur, a sprinkling can may be used; be sure the heigl of the can and the amount of water used are kept constant for the various splash board experiments.

LEVEL: 10-12

SUBJECT: Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

I-4 In any environment, one component like: space, water, air, or food may become a limiting factor.

PURPOSE: Most communities of plants and animals tend to change. A group of organisms is replaced by a second, the second may be replaced by a third. Each new organism that gains supremacy alters the environment and provides conditions that favor other species. Thus, populations may change from hour to hour and day to day. Some successions, such as changing organisms in a temporary rain puddle, occur on a very small scale. Such a succession is usually over in a matter of days. Other successions, such as a change from bare ground to mature forest, may take a century or more.

REFERENCE: "Teachers Curriculum Guide for Field Ecology," Center for Environmental Education, Brevard County Schools, Cocoa, Florida 32922.

ACTIVITY: Investigation: Succession in a Microcosm

Materials:

5 jars to collect pond water	Cover glass
Cultures of pond water	Light meter
Centigrade thermometer	Pipette
Hydrion paper	Slide
Microscope	

Procedure: Select a stream, pond, or lake from which you can collect your water cultures. Fill five quart jars three-fourths full of water containing some plant material. Some cultures should contain floating vegetation such as duckweed, others should contain algae only, and one culture should contain some submerged vegetation and dead plant material. This will create a different environment for each culture.

Place the cultures in an area of the laboratory where each will receive the same amount of light. If you have a light meter, check the light at various times of the day. (a) What is the variation in foot candles of light available to the cultures? (b) Why is light important in the study?

Using a centigrade thermometer, check the temperature of the culture each day that you examine the water.
(c) Why is the temperature an important factor in succession in the jar?

Using Hydrion paper, check the pH of the medium each day of the examination and draw a line graph of the changes.
(d) How is the pH of the medium related to succession?
(e) What factor is responsible for the change in pH?

Examination of the cultures should be made on alternate days for a period of three weeks. Since organisms occur at all levels of the culture, remove a drop from the surface, a drop from approximately 4 cm from the surface and one from the bottom for study. Study each drop of water under the low power of the microscope and determine what organisms are present.

In the five drops taken from the surface, count the number of each species present. Determine the average number of each species in the five drops.

Set up a chart on which to record these averages. The chart should include such groups as green protists, non-green protists, rotifers, crustaceans, annelids, gastrotrichs, and others, as you find them.
(f) What type of organisms did you find on the first day of examination?
(g) How long did these remain in the dominant organisms?
(h) Describe any changes that occur in the water.
(i) What caused the changes in the water?
(j) What organisms assumed dominance after the water became turbid?
(k) Explain why these organisms became dominant.
(l) Explain why the cultures became clear at the end of the experiment.
(m) What organisms followed Colpoda and Colpodium in the succession?
(n) What other organisms occurred in the succession?
(o) When did the rotifers and gastrotrichs appear?
(p) What factors govern the succession in the water cultures?

LEVEL: 10-12

SUBJECT: Science

PROBLEM AREA: IV-11 Eco-Community Relationships - Water Quality

CONCEPT: IV-5 Increasing human populations, rising levels of living, and the resultant demands for greater industrial and agricultural productivity promote increasing environmental contamination.

PURPOSE: To become aware of the extent of phosphate pollution in fresh water supplies and the effect of phosphates on microscopic life in water.

REFERENCE: "Phosphate--Some Studies of How It Affects Our Water", Ann L. Abeles, The Science Teacher, February, 1972.

ACTIVITY: Using a phosphate test kit such as is available from La Motte Chemical Products or Hach Chemical Company, have students calculate the amount of phosphate present in the recommended amounts of several different detergents used for washing clothes. Use the data to make rough calculations of the amount of phosphates put into the community sewage system by the use of detergents.

Collect samples of water above and below the city sewage disposal plant. Analyze both for phosphate content. Keep the samples at room temperature and bubble air through them for several days. Examine both samples microscopically over a period of several days to note kinds and numbers of microorganisms developing in each sample.

Do students find any evidence of "bloom" in either sample? How important is this phenomenon in our streams and lakes? What can or should be done about it?

Students may investigate other sources of phosphate contamination and should become aware of commercial fertilizers and animal wastes as equally significant contributors.

LEVEL: 10-12

SUBJECT: Science

PROBLEM AREA: II-5 Health Considerations - Food Quality: Pesticides, Additives

CONCEPT: IV-4 Man has been a factor affecting plant and animal succession and environmental processes.

PURPOSE: To become aware of the ingredients found in pesticides, the extent of pesticide use, and the possible results of such use.

REFERENCE: Environmental Crises, Authorized Course of Instruction for the Quinmester Program, Dade County (Florida) Public Schools.

ACTIVITY: Assign to one or two students the responsibility to read Rachel Carson's Silent Spring and give a short, concise report to the class. If possible, follow up the report with a showing of the film, "Silent Spring", available from many sources.

Ask for several volunteers from the class to visit garden stores, hardware stores, or other places where pesticides are sold. List the ingredients found on the labels and attempt to find out which types may or may not be dangerous to mammals.

Contact persons such as agricultural agents to find out what types are used for large-scale agricultural production.

Report findings back to the class. Discuss whether the fears of Carson are real or imagined. Why?

LEVEL: 10-12

SUBJECT: Science

PROBLEM AREA: IV-7 Eco-Community Relationships - Species Control: Non-Human

CONCEPT: IV-4 Man has been a factor affecting plant and animal succession and environmental processes.

PURPOSE: To develop understanding on the nature and value of selective breeding of plants and animals.

ACTIVITY: During a study of genetics ask for several volunteers to do research on the changes that resulted from selective breeding of corn, rice, wheat, chickens, hogs, cattle, or other organisms prominent in man's food supply. County agents or other agricultural specialists as well as library references should be consulted. Urge students to get specific information, if possible, about increased average egg production per hen over the last 50 years. The increased production of milk cows. The improved quality of beef. The increased production on an acre of corn, rice, or wheat.

Have students share their findings with the class using transparencies, charts, or other useful techniques to dramatize their results.

Is there a limit on what can be done to improve food production by such means?

LEVEL: 7-9
10-12

SUBJECT: Science

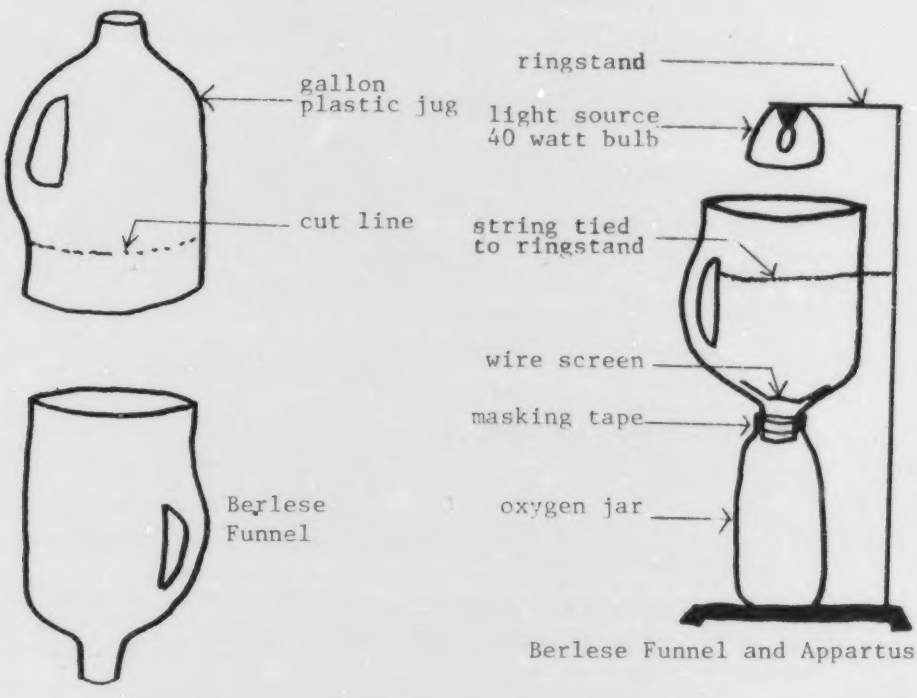
PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: In order to determine the number and kinds of macro-organisms found in the soil, a Berlese funnel may be constructed for use in collecting these organisms. Using a light bulb as a source of heat, the organisms are driven away from the heat through the Berlese funnel into a collecting jar (oxygen jar). A wire screen is used to hold the soil in the funnel; the size of the screen mesh will determine which organisms can pass through. Once the organisms are collected, the diverse life forms in the soil can be observed.

REFERENCE: "Teachers Curriculum Guide for [illegible] Ecology," Center for Environmental Education, Brev[illegible]d County Schools, Cocoa, Florida 32922.

ACTIVITY: Constructing a Berlese Funnel



Berlese Funnel and Appartus

LEVEL: 7-9
10-12

SUBJECT: Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To provide a method by which students will recognize individual animal tracks when encountered in the field.

REFERENCE: "Teachers Curriculum Guide for Field Ecology," Center for Environmental Education, Brevard County Schools, Cocoa, Florida 32922.

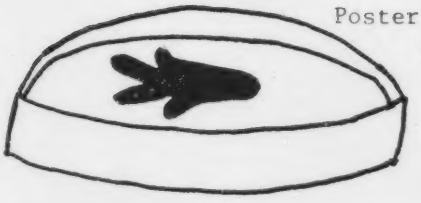
ACTIVITY: Casting Animal Tracks

Materials: forceps, plaster of Paris, poster board strips two inches wide of various lengths, india ink, small brushes, spray can of shellac.

After locating the animal tracks, follow the procedure below:

1. Clean track of all debris, spray track with shellac or plastic.
2. Form poster board circle around print and press into ground to create a pouring form (Fig. 1).
3. Make certain that there is at least one inch of poster board above the surface.
4. Mix plaster of Paris to the thickness of pancake batter.
5. Pour the mold full of the mixture. Allow it to harden before lifting out of track (Fig. 2).
6. Clean surface of cast and coat with vaseline.
7. Form mold around cast and pour mixture until level with top of mold. If the track case is to be hung on a wall, place wire loop in surface of mixture. Let harden at least two hours (Fig. 3).
8. Remove mold and separate the two layers; wipe vaseline from cast (Fig. 4).
9. Scrape and wash cast - smooth with fine sand paper.
10. When thoroughly dry, paint inside of track with india ink and label.

Fig. 1



Pour this mold full of plaster mix.

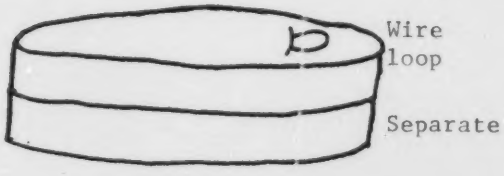
Fig. 2

Plaster Cast

Fig. 3

Poster board mold around first cast-coat cast with vaseline.

Fig. 4



Remove mold around the two layers of casts and separate at joint.

LEVEL: 10-12

SUBJECT: Science

PROBLEM AREA: III-2 Genetic Considerations - Chemicals in Food

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To enable students to understand more fully the changes which have occurred in recent years in mass-producing, transporting, storing, packaging, and marketing of food. To become aware of some of the dangers as well as benefits of these changes.

REFERENCE: Man and Environment for Secondary Schools, National Association for Environmental Education, P. O. Box 1295, Miami, Florida 33143.

ACTIVITY: Review with the class the fundamental composition of natural foods (protein, carbohydrates, fats, vitamins, minerals). After some general discussion on what happens to natural foods as they are processed before appearing in our supermarkets, divide the class into four groups which will be responsible, after some research, for describing and giving examples as follows:

Describe and give examples of how and why additions are made to foods through food production practices; look for such additives as pesticides, enzymes, herbicides, antibiotics, etc.

Describe and give examples of how and why additives are made to foods through food preparation practices; include such examples as trash, animal wastes, poisons.

Describe and give examples of how and why deletion of food components occurs during food preparation; for example, loss of minerals and vitamins.

Describe and give examples of how and why additions are made to food during food processing; for example, tenderizers, coloring agents, flavor enhancers, fillage, etc.

After presentation to the class, each group should lead the class in discussion of the seriousness of the problem as they view it, along with suggestions concerning what action might be taken by individuals, citizens groups, business interests, and government to improve food quality.

LEVEL: 10-12

SUBJECT: Science

PROBLEM AREA: IV-4 Eco-Community Relationships - Energy Production

CONCEPT: I-2 Green plants are the ultimate sources of food, clothing, shelter, and energy in most societies.

PURPOSE: To understand more fully the tremendous amounts of energy available in sunlight.

ACTIVITY: Involve the class in designing and constructing a very efficient heat absorbing apparatus in which water will be heated by sunlight. Since the class will have available all the data needed (specific heat of water, specific heat of container, area of surface absorbing heat, time of experiment, etc.) it will be possible to calculate calories, joules, kilowatts, horsepower, dynes, ergs, etc. secured from the sun by the apparatus. Calculate what would be available if such a system would be enlarged 10, 100, 1000 times or more.

Ask class members to do library research on new promising ideas to use solar energy. Why don't we use the source more heavily? What about the future prospects?

:VEL: 10-12

JBJECT: Science

ROBLEM AREA: II-4 Health Considerations - Water Quality

)NCEPT: I-4 In any environment, one component like: space, water, air, or food may become a limiting factor.

URPOSE: To dramatize the seriousness of water shortages in future years as foreseen by long range planners.

EFERENCE: Environmental Educational Instructional Activities for Grades 7-12, New York State Education Department.

CTIVITY: Divide the class into two groups. One group should divide among its members the responsibility to investigate methods of improving the quality of present water supplies by such approaches as (1) recycling, (2) curbing industrial effluent, (3) reducing evaporation losses and (4) better water harvesting.

'he second group should divide responsibility to investiate methods of enlarging our water supplies by such pproaches as (1) distillation of sea water (2) ion-change methods (3) reverse osmosis and (4) towing and elting icebergs.

ve the class debate and contrast the two approaches. ich do they prefer? Why?

LEVEL: 10-12

SUBJECT: Science

PROBLEM AREA: II-4 Health Considerations - Radioactivity

CONCEPT: I-4 In any environment, one component like: space, water, air or food may become a limiting factor.

PURPOSE: To become more aware of bacterial and chemical pollution in water supplies and of problems associated with securing adequate water supplies for large urban areas.

REFERENCE: Environmental Educational Instructional Activities for Grades 7-12, New York State Education Department.

ACTIVITY: Obtain a water test kit and use it as the enclosed directions will suggest to test water samples obtained from such places as school drinking fountain, home water source, local ponds, local streams, bottled water purchased at store, distilled water, and other sources available.

Also test for bacterial content by using sterile culture dishes in the conventional laboratory manner.

Involve the class in discussing such things as the causes of the pollution formed. What can be done to improve conditions? Why isn't this happening? How is their water purified? Does their community have a present or forseeable water problem?

LEVEL: 10-12

SUBJECT: Science

PROBLEM AREA: IV-2 Eco-Community Relationships - Land Use

CONCEPT: III-1 The management of natural resources to meet the needs of successive generations demands long-range planning.

PURPOSE: To become more fully aware of the huge amounts of soil eroded from strip mine spoil banks.

ACTIVITY: Review with a geometry, or other appropriate mathematics class, the procedure which can be used to obtain a rough approximation of the volume of a gully. Prior to this review, one or two students could have made the special gully measuring apparatus described on the following page.

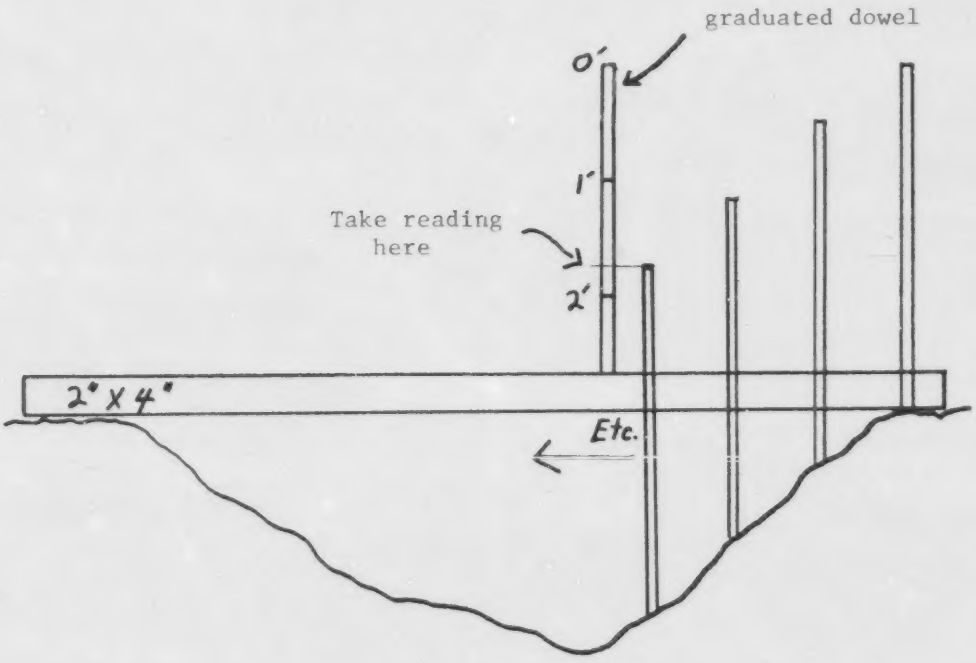
Select and carefully determine the acreage of a slope where gullies are several feet deep. Measure the volume of all gullies in the area being studied at appropriate cross section points. With proper calculations of these volumes and gully lengths, the total volume of soil eroded may be determined. Calculations can also determine loss per acre and loss per acre per year if the age of the spoil bank is known.

Results obtained should, of course, be discussed in terms of loss of a critical natural resource, stream pollution, and other concerns which come to mind.

Special Measuring Apparatus

This device consists of a 2" x 4" x 10' board drilled to accept either 3/8" or 1/2" dowels obtainable from any lumber yard. Using a drill press to insure parallel holes and starting one foot from either end, drill holes through the greater dimension of the 2" x 4" every six inches until you have come within one foot of the other end. You should have 19 holes. These should be slightly larger than the dowels to be used to allow for slippage as the dowels must slide freely. Obtain 20 dowels of the appropriate size. 19 will be used in the holes, the 20th will be used as a measuring stick. To calibrate the 20th dowel start 3 1/2" from the top and mark the dowel in feet, tenths, and hundredths. (The 3 1/2" is to compensate for the thickness of the 2 x 4.)

To use the instrument place it across the gully at the location selected by the investigators and allow the dowels to come to rest at the bottom of the gully. The first hole should be at the edge of the gully so that the first dowel does not drop noticeably. Using the measuring stick, determine the depth of the gully at each dowel by placing it on top of the 2 x 4 and measuring the top of each dowel. See the diagram below.



LEVEL: 7-9
10-12

SUBJECT: Science

PROBLEM AREA: IV-11 Eco-Community Relationships - Water Quality

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To develop understanding about the relationships between quality of water and the number and kind of organisms found in different samples of water.

REFERENCE: "Aquatic Ecology Unit" in Exploring the World. An Environmental Handbook prepared for School District #2, Billings, Montana.

ACTIVITY: Divide the class into groups of 2-4. Each group should obtain a one-gallon wide mouth jar and fill it with pond or stream water known to contain some "little critters." Each group should try to use a different source. The jar should contain 1-2 cm. of ooze taken at the same point as the water sample.

Over a period of several weeks each group makes macroscopic and microscopic counts twice a week of the organisms found in its jar. With the aid of a key each group should identify type and estimate number of organisms such as protozoa, hydra, rotifers, nematodes, diptera, and capepod. Through careful recording of data differences between samples and differences within a sample over a period of time will be noted. Involve students in explaining the differences and in speculating about the relationship between these organisms and others such as fish and fish-eating animals.

LEVEL: 7-9
10-12

SUBJECT: Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To allow students to conduct scientifically controlled experiments to collect data and to construct hypotheses. To show the movement of materials within an ecosystem and the soil of certain organisms in this movement.

REFERENCE: "Tree Litter to Sow Bug Litter", Minnesota Environmental Education Committee, 350 Centennial Office Building, St. Paul, Minnesota 55155.

ACTIVITY: Sow bugs are crustaceans that live in cool, dark, moist places in forest ecosystems. During the fall and spring, students should be able to collect a large number of these by looking under logs, stones, branch and leaf litter in wooded areas.

This activity is designed to show that sow bugs contribute to the forest litter by digesting leaves and by producing litter of their own in the form of droppings and their own dead bodies. It also can be shown that sow bugs have a preference for certain types of leaves and that they can digest some leaves quicker than others.

Collect several leaves of varying kinds (beech, oak, maple, pine, etc.) and place each kind in a closed container with several (8-10) sow bugs. Plastic bags filled with air make excellent containers. There should be plenty of moisture in each container; if plastic bags are used, the air supply may need to be renewed daily. Do not keep the containers in the direct sun.

Have each student keep a record of changes in sow bugs (number, size), number of days taken to completely eat the leaves, type of leaves used, etc. After several days of observation and data collection, compile the class's data and have each student construct hypotheses on sow bug behavior based on the data collected.

LEVEL: 10-12

SUBJECT: Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To determine the presence of micro-organisms in the soil. The number of micro-organisms found in the soil depends on the type of soil; a rich loam may have as many as 5 billion bacteria per grain. Most of this micro-life exists near the surface where organic matter accumulates.

REFERENCE: "Teachers Curriculum Guide for Field Ecology", Center for Environmental Education, Brevard County Schools, Cocoa, Florida 32922.

ACTIVITY:

Materials:

3 test tubes	agar growth medium
1 petri dish	soil sample
dilution loop	dechlorinated water

Procedure:

1. Sterilize the petri dish; this can be done in boiling water. Prepare the growth medium (instant media can be purchased from supply houses or recipes for growth media can be found in science sourcebooks) and pour into petri dish. Set this aside to cool.

2. Sterilize the 3 test tubes and number them 1-3.

3. Fill test tube #1 1/3 full of soil sample and add a few milliliters of sterile dechlorinated water; shake well. Fill remaining tubes each with 10 ml. of sterile dechlorinated water.

4. Using a flame-sterilized loop transfer one loopful of water from the top of soil sample tube to tube #2; swirl the tube to mix. Since one loopful of water is approximately 1/100 ml., the micro-organisms in tube #2 are now diluted to 1/1000.

5. Flame the loop again and transfer one loopful of water from tube #2 to tube #3. The micro-organisms are now diluted to 1/100,000.

6. Using a sterile loop, spread several loopfuls of material from tube #3 over the growth medium in the petri dish.

7. Cover the petri dish and set it aside in a warm place for 48 hours.

8. Observe the numerous colonies of growth; write up your results.

9. When you are completely through with the colonies, clean thoroughly by flooding the petri dish with a strong bleach.

LEVEL: 10-12

SUBJECT: Science
Social Studies

PROBLEM AREA: IV-12 Eco-Community Relationships - Humans

CONCEPT: III-4 Management is the result of technical and scientific knowledge being applied in a rational direction to achieve a particular objective.

PURPOSE: To acquire some introductory awareness of problems of forest management and to become aware of public relations efforts made by large corporations.

REFERENCE: Social Studies Resource Units, Brevard (Florida) County Schools.

ACTIVITY: Examine carefully the St. Regis Paper Company advertisement listed below. Do you agree or disagree with the arguments presented?

Select 3-5 class members to interview specialists who probably know more about forestry and wildlife than the class members do. Do their answers agree with the class?

Discuss whether the government should play a role in regulating privately-owned forest land use.

ODDLY ENOUGH, WILD ANIMALS PREFER MAN'S WAY
OF RUNNING A FOREST.

Most people probably think a wild forest is teeming with life. While a harvested one is sterile and lifeless. Just the opposite is true.

In a mature, wild forest, the trees have all grown to about the same height. Their luxuriant crowns interlock and form a dense canopy. And almost completely cut off the sun's rays.

So the forest floor is dark and almost completely devoid of small plant life. There's no brush, no seedlings, no saplings. And therefore, few wild animals. Because this new growth is what feeds and shelters the whole spectrum of animal life. From deer to deer mice.

But managed forests, like the 8 million acres of trees St. Regis takes care of, are truly teeming with life.

Within a few months after we harvest an area - and in New Hampshire, for instance, we usually leave 40% to 60% of the trees - new growth starts.

A then, as soon as there's enough food and shelter,

the animal population begins to increase. First, the tiny eaters of seeds and insects. Then the browsers, like deer and moose. Finally, the predators.

We're not suggesting that all forests should be harvested. Far from it. We all benefit in some way from the preservation of wilderness. But we all benefit from managed forests, too. Man and animals.

In fact, we've found that man's needs don't have to be at odds with Nature's. As long as we follow a certain concept that St. Regis believes in:

Nature will cooperate with man, if man learns to cooperate with Nature.

LEVEL: 10-12

SUBJECT: Science
Social Studies

PROBLEM AREA: IV-6 Eco-Community Relationships - Population Studies

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To develop increased understanding of the principle that environmental pressure of the human population is a function of numbers, population density, and culture. To become more aware of the fact that further increases in population stress will require planning and development if the quality of the environment, culture, mental and physical health of mankind is to be maintained or improved in the face of changes now possible.

REFERENCE: Environmental Quality and The Citizen, Clausen and Iverson, Soil Conservation Society of America.

ACTIVITY: The following multiple choice questions may be put to the class, with the hypothetical case study used to stimulate these discussions. Have the participants answer the following questions without discussion. Present the case study for discussion and debate.

1. The main reason for a population explosion is that too many babies are born each year.

   a. Strongly agree
   b. Agree
   c. Disagree
   d. Strongly disagree

2. Good health and sanitation practices should be one of the first things to be developed in an "emerging nation".

   a. Strongly agree
   b. Agree
   c. Disagree
   d. Strongly disagree

3. Population growth usually results from a lower death rate among senior citizens.

   a. Strongly agree
   b. Agree
   c. Disagree
   d. Strongly disagree

4. A country is always better off when its people are free from diseases (malaria, etc.).

   a. Strongly agree
   b. Agree
   c. Disagree
   d. Strongly disagree

5. By exporting agricultural technology, western societies could eliminate starvation throughout the world.

a. Strongly agree
b. Agree
c. Disagree
d. Strongly disagree

CASE STUDY

A young, newly-elected president of a small underdeveloped yet emerging island nation in the Pacific Ocean (a former British colony) is faced with a tough decision. He must decide whether or not to ask western technicians to come in and spray for malaria and to allow western doctors to vaccinate the entire population for contagious and infectious diseases that cause most of the deaths on the island.

This seems like no problem at all. In fact, many would call it a blessing. But this president has seen from example that it is not a blessing. Other nearby islands accepted similar "help" from other countries to improve health and sanitation, and it literally cut the death rate in half almost overnight. The result was that twice as many babies lived (for here is where cuts in death rate have the greatest effect). Per person food supplies drop sharply on the already near-starving islands.

The young president realizes that health and sanitation can be spread widely in a country with overwhelming results. However, there may be no corresponding increases in education and the economy. This is generally the case, as he has seen. In fact, the economy may fall to a lower level than before. He knows also that starving people do not starve quietly, particularly those people who have "seen it better." He guesses that if he accepts help from the western nation, this is likely all he will receive.

The possibility of having a much higher percentage of non-workers (dependents less than 15 years old and the elderly) among his people is a frustrating prospect. The land, even now, has an overabundance of workers--working at the subsistence level of agriculture. The main occupation is farming, and there is relatively little industry. The farmable land (and even the unfarmable) has been strained to its capacity. Workers no longer can produce high yields without mechanization. The soil is nearing depletion as the result of constant growing over the years. The president feels it is quite possible that his young country will not be able to bear the population increase, But he also knows that, when given a choice between life or death, all people -- throughout history--choose life over death. If his own people hear that he has decided to keep health and sanitation from their country, it could very well mean death for him.

LEVEL: 10-12

SUBJECT: Science
Social Studies

PROBLEM AREA: IV Eco-Community Relationships - Species Control (Non-Human)

CONCEPT: III-1 The management of natural resources to meet the needs of successive generations demands long-range planning.

PURPOSE: To develop awareness of the extent to which game animals are controlled by natural ecological forces or by regulations (or lack of regulations) imposed by man.

REFERENCE: Environmental Education Staff, Kenai Peninsula Borough School District, P.O. Box 1266, Soldotna, Alaska 99669.

ACTIVITY: Out of class discussion identify the pressure groups interested in problems of wildlife management or use (conservation societies, National Rifle Association, hunters, trappers, guides, resort owners, sportsmen, etc.). Divide the class into groups and have each group collect data from persons representing the special interest groups cited above. Attempt to get judgments concerning specific rules and regulations which they regard as right or wrong--try to find out why the respondents take the position they do.

Summarize findings obtained by the various groups and attempt to reach concensus about areas needing attention. If possible, draft suggested changes in rules and regulations you deem necessary and send copies to proper authorities, newspapers, and other interested groups.

LEVEL: 10-12

SUBJECT: Science
Social Studies

PROBLEM AREA: IV-4 Eco-Community Relationships - Energy Production

CONCEPT: IV-5 Increasing human populations, rising levels of living, and the resultant demands for greater industrial and agricultural productivity promotes increasing environmental contamination.

PURPOSE: To develop understanding of the basic idea of nuclear energy and to examine advantages and disadvantages of nuclear power plants.

REFERENCE: Environmental Education. A Teacher's Guide with Inquiry and Value Seeking Strategies. Santee School District, Santee, California 92071.

ACTIVITY: Develop through use of simple readings, films and/or film strips, and discussion, an understanding of nuclear energy and nuclear power plants.

Involve the class in discussing the results of thermal pollution, the disposal of radioactive wastes, the advantage of nuclear power plants, and so forth. Why is our need for electrical power increasing so rapidly? Why are more nuclear plants being built? Can our civilization survive without nuclear power? How? Why or why not?

LEVEL: 7-9
10-12

SUBJECT: Science
Social Studies

PROBLEM AREA: IV-12 Eco-Community Relationships - Humans

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To understand the continuous recycling process of nature and to see how man himself is a major interfering factor in this process.

REFERENCE: Environmental Educational Instructional Activities for Grades 7-12, New York State Education Department.

ACTIVITY: Review with students the cycle by which animal wastes and dead animals and plants revert back to the soil where they are available for future plant and subsequent animal use.

Through questioning help students understand how man's wastes and dead bodies are, in the U.S.A., notable exceptions to the general cycle. Get students to estimate the amount of organic material man takes from the soil which he flushes into rivers or other bodies of water. Is this material "lost"? What happens to it? Does it return to the soil? Who, if anyone, should be concerned about this problem? What practical answers can students suggest?

LEVEL: 4-6
7-9
10-12

SUBJECT: Science
Fine Arts

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

I-2 Green plants are the ultimate sources of food, clothing, shelter, and energy in most societies.

PURPOSE: Students will construct a food pyramid to observe the complexity of relationships and maintenance of them. This activity is designed to incorporate psychomotor skills in the construction of a food pyramid so that the student may become aware of the relationships and balances involved in food chains. Skills in levers and balances concepts are also involved.

ACTIVITY: Food Pyramid Mobile

Materials: pictures of organisms (producers, consumers, and decomposers), wire (straws, wood), string, scissors (optional), glue (optional).

Procedure: Students are to construct a mobile which represents a simple food chain (pyramid) based upon their understanding of food pyramids and the ecosystem. Materials should be made available for students to use as they wish in accomplishing the objective.

Conclusions: As you observe your mobile from top to its base, what is the relationship of numbers of organisms to place in the mobile? Where are the producers in your mobile? Where are the primary consumers in your mobile? Where are the other consumers in your mobile? What happens to your mobile when you remove one of the producers? What happens to your mobile when you remove one of the consumers? What happens when you remove a whole set of producers from the mobile? What is the final consumer of your mobile? What other organisms could be at the "top" of the mobile?

LEVEL: 10-12

SUBJECT: Mathematics
Science

PROBLEM AREA: V Psychological and Behavioral Considerations - Social Aspects

CONCEPT: II-1 The culture of a group is its learned behavior in the form of customs, habits, attitudes, institutions, and lifeways that are transmitted to its progeny.

PURPOSE: To help students develop the ability to examine their environment more carefully and to become aware of man's application of geometric principles in his environment.

REFERENCE: Environmental Geometry, Environmental Education Section of Alaska Department of Education.

ACTIVITY: Involve the class in discussion about types of geometric shapes that might be found in their environment (Round, Rectangular, Square, Trapezoid, Hexagon, Parallel line, Octagon, etc.)

Divide the class into groups of 4-5 to take a short working trip to discover examples of applied or natural geometry such as bolts, guy wire supports, cranes, highway signs, playground swing supports, etc. Have groups report their observations to the class and lead discussion on why particular geometric shapes are found in certain places.

The activity can be expanded by having class members interview specialists in the community who make extensive use of geometry (carpenter, gardener, heavy duty mechanic, equipment operator, etc.) to learn more about the principles applied by that worker and have findings reported back to the class.

LEVEL: 10-12

SUBJECT: Social Studies

PROBLEM AREA: I-8 Aesthetic Considerations - City Planning and Convenience

CONCEPT: III-4 Management is the result of technical and scientific knowledge being applied in a rational direction to achieve a particular objective.

PURPOSE: To encourage creative thinking about possible solutions to some of the massive environmental problems associated with large urban areas.

REFERENCE: What Is A City?, A Multi-Media Guide on Urban Living. Boston Public Library, 1969.

ACTIVITY: Secure and show to the class the film "Overload In The Cities" produced by NBC and distributed by Doubleday. Questions such as the following are posed in this exciting film.

Where will the next 100 million Americans live?

What does bad housing do to people?

Can we continue to let people do just as they please?

The film suggests often radical solutions to these and other big city problems.

The 15-minute color film can set the stage for stimulating class discussion and follow-up research pointed toward oral or written reporting back to the class.

LEVEL: 10-12

SUBJECT: Social Studies

PROBLEM AREA: IV-4 Eco-Community Relationships - Energy Production

CONCEPT: II-3 Natural resources affect and are affected by the material welfare of a culture and directly or indirectly by philosophy, religion, government, and the arts.

PURPOSE: To understand that increasing world population and standard of living has raised the consumption levels of energy and natural resources to an alarming level.

REFERENCE: Man and Environment for Secondary Schools, National Association for Environmental Education, P.O. Box 1295, Miami, Florida 33143.

ACTIVITY: Reviewing their knowledge of life in colonial America, have the class examine the energy sources and the amount of energy used to provide food, clothing, and shelter for a colonial family. Assign students the task of examining the sources and amounts needed to provide for their families today. Secure population data for U.S.A. in colonial times and today. Involve the class in interpreting these data and their implications for the future.

LEVEL: 10-12

SUBJECT: Social Studies

PROBLEM AREA: IV-3 Eco-Community Relationships - Natural Resources Use

CONCEPT: II-3 Natural resources affect and are affected by the material welfare of a culture and directly or indirectly by philosophy, religion, government, and the arts.

PURPOSE: To assist students in understanding:

1. There is a relationship between economics and the environment.
2. There is a relationship between public and private property in environmental problems.
3. The product-cost of many items we use does not truly reflect the total cost.

REFERENCE: Man and Environment for Secondary Schools, National Association for Environmental Education, P.O. Box 1295, Miami, Florida 33143.

ACTIVITY: Individually, or in small groups, have the class members develop answers to the following questions:

What is property?
Who owns it?
Who controls it and how?
When does property become an environmental concern?
Who owns the natural resources of air, water, forest, minerals, petroleum?

Using automobiles as an example of property, have the class consider the actual cost of producing and using automobiles for transportation. Consider the hidden costs. Try to discuss who pays for actual and hidden costs.

LEVEL: 10-12

SUBJECT: Social Studies

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: II-2 The relationship between man and the natural environment are mediated by his culture.

PURPOSE: To compare the Bill of Rights found in the United States Constitution with an ecological "Bill of Rights" proposed by a scientist recognized for his leadership in promoting Zero Population Growth. To see where the two lists may be in conflict with each other.

REFERENCE: Social Studies Resource Units, Brevard (Florida) County Schools.

ACTIVITY: Make available to each student a worksheet on which are listed the two Bills of Rights. Urge students to connect the items from each list which are in agreement and, using a different code, connect items which are in disagreement.

Through class discussion, try to reach conclusions about the amount of agreement and disagreement.

What historical facts have lead to the need for someone to propose a new list?

How seriously should his 11 items be considered?

MANKIND'S INALIENABLE RIGHTS

1. The right to eat well.
2. The right to drink pure water.
3. The right to breathe clean air.
4. The right to decent, uncrowded shelter.
5. The right to enjoy natural beauty.
6. The right to avoid regimentation.
7. The right to avoid pesticide poisoning.
8. The right to freedom from thermonuclear war.
9. The right to limit families.
10. The right to educate our children.
11. The right to have grandchildren.

- Paul R. Ehrlich

LEVEL: 10-12

SUBJECT: Social Studies

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: II-3 Natural resources affect and are affected by the material welfare of a culture and directly or indirectly by philosophy, religion, government, and the arts.

PURPOSE: To become aware of the many perspectives from which an environmental problem can be viewed and to understand that the solution can (should) be approached at different levels.

REFERENCE: Man and Environment for Secondary Schools, National Association for Environmental Education, P.O. Box 1295, Miami, Florida 33143.

ACTIVITY: Involve the class in identifying a major environmental hazard in the community such as decay of the central city, pollution of air or water, erosion, or radioactivity. Indicate that the hazard may be considered from the following six perspectives:

Ecological
Engineering
Economic
Esthetic
Ethical
Social

Assist the class in dividing into six groups to consider the environmental hazard or problems from six different perspectives. As they consider the problems and suggest solutions, ask them to suggest the solutions which seem to rest with:

Individuals
Communities
State or Region
Nation or International Organization

Each group should report to the class and assume responsibility for leading total class discussion in their area of concerns.

LEVEL: 10-12

SUBJECT: Social Studies

PROBLEM AREA: IV Eco-Community Relationships - Humans

CONCEPT: II-2 The relationships between man and the natural environment are mediated by his culture.

PURPOSE: To develop greater understanding of the benefits and harms which seem to be associated with technology. To assist students to think seriously about their life styles and the extent to which technology is becoming their personal master or servant.

REFERENCE: Man and Environment for Secondary Schools, National Association for Environmental Education, P.O. Box 1295, Miami, Florida 33143.

ACTIVITY: Divide the class into groups of 3-4 students and ask each group to develop a list of 10 benefits and 10 harms of technology which they believe have come about during the last 20-30 years. Develop a master list from the small group reports to the class and select the few benefits and harms on which there is general agreement.

Speculate on the reasons why the class agreed on the beneficial examples and the harmful ones. Assign individuals who are interested to write position papers in which they suggest how the harmful results of technology might be reduced or eliminated. Is the answer more technology or something else? What, if anything, are they personally planning to do to control technology?

LEVEL: 10-12

SUBJECT: Social Studies

PROBLEM AREA: IV-5 Eco-Community Relationships - Urban Planning

CONCEPT: II-1 The culture of a group is its learned behavior in the form of customs, habits, attitudes, institutions, and lifeways that are transmitted to its progeny.

PURPOSE: To understand more fully the various "habitats" which exist in a large urban area. To become aware of closed and forced niche-relationships that result in tension and city problems.

REFERENCE: Man and Environment for Secondary Schools, National Association for Environmental Education, P.O. Box 1295, Miami, Florida 33143.

ACTIVITY: Involve the class in listing on the chalkboard the major areas, regions, or "habitats" found in their urban area. These would include such things as: heavy manufacturing, light manufacturing, commercial, financial, communication, service, educational, outdoor recreational, indoor recreational, and residential (high, low, etc.).

Arrange for small groups of students (2-4) to research the location of one of these areas in their city, to identify some large firms-companies-industries in their area and to place their data on a large map which will be built as a class project.

Each group should also take responsibility for discussing how their "habitat" relates to one or two others in terms of transportation, energy flow, or other factors.

LEVEL: 10-12

SUBJECT: Social Science

PROBLEM AREA: IV - Eco-Community Relationships

V - Psychological and Behavioral Considerations

CONCEPT: I-1 Living things are interdependent with one another and their environment.

PURPOSE: To examine conflicts that exist between individual freedom of choice and long-range ecological concerns.

REFERENCE: Environmental Education - a Teacher's Guide with Inquiry and Value Seeking Strategies. Santee School District, Santee, California 92071.

ACTIVITY: Review with the class the following list of "rights" obtained from Arthur S. Boughey's book Man and the Environment. Indicate Boughey's belief that individuals must be willing to give up these rights if the world is to develop more peaceful social arrangements and if the world is to have some chance for survival without catastrophic ecological change.

Involve the class in (1) individual or group research on some of the "rights" or (2) organizing for debates on some of the proposals or (3) act as a town meeting group to discuss and to act on these issues for acceptance or rejection for their community of some of the proposals suggested as necessary.

The right to have as many children as we wish.

The right to have any children at all by mates with particular genotypes.

The right to keep pets which consume food which could directly or indirectly be used for human purposes while populations and individuals elsewhere are stunted from malnutrition or dying from starvation.

The right to externalize our labor problems by strikes which dislocate societal facilities.

The right to reside in any locality of our own choice in these United States.

The right to accumulate wealth entirely disparate with basic needs while many elsewhere still cannot satisfy these, or to transfer inherited wealth without reduction to an indefinite number of descendant generations.

The right to monopolize what would otherwise be community facilities.

The right to exploit national resources to the public detriment.

The right to possess lethal weapons.

The right to discharge wastes into the environment.

LEVEL: 10-12

SUBJECT: Social Studies

PROBLEM AREA: I Aesthetic Considerations
IV Eco-Community Relations
V Psychological-Behavioral Considerations

CONCEPT: II-2 The relationships between man and the natural environment are mediated by his culture.

PURPOSE: This series of activities provides some understanding of the political and legal aspects involved in determining the role of local government in facing environmental issues. The students should gain some understanding of the forces that give impetus to present environmental laws and of the relationships of different governmental levels in policy setting, law making, and enforcement. Students should learn to recognize evaluated facts as opposed to forms of propaganda. Individual decisions based on facts could lead to responsible action.

REFERENCE: The Curious Entanglement of Law, Politics, and the Environment by Dr. Clair W. Bemiss, Center for Environmental Education, Brevard County Schools, 705 Avocado Avenue, Cocoa, Florida 32922.

ACTIVITY: Using area maps, have students locate major highways, dumps, population centers, sewer outfalls, power plants, and waterways. List potential environmental problems that you foresee for this area. Use such resources as County Commissioners, City Managers, Mayors, game wardens, newspapers, public health boards, etc., to investigate one of the potential problems. For each problem, allow the student to discover what laws are already in existence concerning this problem and how these laws are enforced.

This activity can be developed into a major study theme for a semester or a year. Some major questions to be considered are:

What events or forces gave impetus to current environmental laws?

How do various governmental agencies effectively enforce environmental control laws?

How do agencies in different levels of government interact?

Under what conditions would a citizen need to seek court action in a pollution case?

How do local governments finance environmental control programs?

How do local governments pollute?

LEVEL: 10-12

SUBJECT: Social Studies

PROBLEM AREA: V-2 Psychological and Behavioral Considerations - Social Aspects

CONCEPT: III-4 Management is the result of technical and scientific knowledge being applied in a rational direction to achieve a particular objective.

PURPOSE: To examine the attitudes held by peers, parents, and community residents toward automobiles and public transportation.

REFERENCE: Environmental Educational Instructional Activities for Grade[illegible]-12, New York State Education Department.

ACTIVITY: Involve the class in developing a survey instrument to be used with schoolmates, parents, and community residents to determine the value respondents place on automobiles and public transportation. This could be an interview schedule, regular questionnaire, or both. Try to develop questions that examine attitudes regarding the social and economic status of owning an automobile. Try to determine what would be necessary to get people to substitute public transportation for private automobile use.

Pool data collected into a master table and analyze in class discussion. Examine questions such as why it will be difficult to persuade Americans to reduce their use of automobiles. Discuss ways this might be brought about.

LEVEL: 10-12

SUBJECT: Social Studies

PROBLEM AREA: IV-5 Eco-Community Relationships - Urban Planning

CONCEPT: III-3 Environmental management involves the application of knowledge from many different disciplines.

PURPOSE: To become aware of the many factors that should be considered in locating a new housing development and the political forces that must be reconciled.

REFERENCE: Environmental Educational Instructional Activities for Grades 7-12, New York State Education Department.

ACTIVITY: Ask a small group of students (3-5) to attend a City Council or Town Board meeting where authorization for a new housing development is being sought. On the basis of this experience and additional study the students should develop a plan to involve the entire class in a dramatized simulated session of city council where approval for a controversial housing development or trailer park is being considered. An effort should be made to have students represent the many interested groups such as realtors, conservationists, highway department, sanitation department, water and sewage department, educators, power companies, etc. at the hearing.

Students playing these roles or the roles of city officials at the hearing should attempt to present honestly the viewpoints held by the various persons.

Following the dramatization the class might discuss such issues as the "rights" of the various groups interested in the proposed development. Legal or illegal acts possible in such a situation. The desirability of planning for open spaces. Considerations necessary for drainage, sewer systems, and natural environment.

LEVEL: 7-9
10-12

SUBJECT: Social Studies

PROBLEM AREA: V-2 Psychological and Behavioral Considerations - Social Aspects

CONCEPT: IV-4 Man has been a factor affecting plant and animal succession and environmental processes.

PURPOSE: To understand the man-made changes which have occurred in a specific locality, to distinguish between planned or unplanned and helpful or harmful changes.

REFERENCE: Environmental Education Instructional Activities for Grades 7-12, New York State Education Department.

ACTIVITY: Divide the class into four groups for the purpose of collecting data from town records or other sources on general land use of the community today, 25, 50, and 100 years ago. Show the changing pattern of use on basic outline maps. Interview some residents who have lived in the community for 25 or 50 years to get their perceptions of the changes that occurred.

In discussion try to determine the changes that were helpful or harmful. What could have been done to prevent the harmful changes? What changes appear to be coming? Will some of them be harmful? If so, how might they be minimized or prevented?

LEVEL: 7-9
10-12

SUBJECT: Social Studies

PROBLEM AREA: V-2 Psychological and Behavioral Considerations - Social Aspects

CONCEPT: II-2 The relationships between man and the natural environment are mediated by his culture.

III-1 The management of natural resources to meet the needs of successive generations demands long-range planning.

PURPOSE: To determine the awareness of the citizenry of your community to the pollution problem and to determine their willingness to play a role in some solutions to the problem.

Man's survival depends a great deal upon the consumer's becoming aware of the pollution problem and some possible solutions. In this exercise you will have an opportunity to determine how much the average citizen knows about the nature of some of the pollution problems and how willing he is to do something about it.

REFERENCE: Teachers Curriculum Guide for Field Ecology. Center for Environmental Education: Brevard County Schools, Cocoa, Florida 32922.

ACTIVITY: Community Attitudes Survey

The basic tool of this exercise is the questionnaire. Each student should survey his neighborhood using the attached questionnaire and recording the answers as to:

Adults (21 years and above)
Young People (20 years or below)

This data should be compiled by class on charts on the board.

From the totals on the board, compute the percentages of YES - NO - MAYBE for each question according to the two divisions:

$$\frac{\text{Total \# answering (YES) (NO) or (MAYBE)}}{\text{Total \# answering the questions}} \times 100$$

From a study of the percentages, try to determine any clear cut differences of opinion between the two groups on any or all of the questions. If any exist, state them.

If any differences of opinion occur between the groups surveyed, attempt to explain why the difference may exist.

From your analysis of the data and your discussion, attempt to make an overall statement of the results of your survey.

ECOLOGY SURVEY

	YES	NO	MAYBE
1. Would you be willing to purchase returnable soft drink and beer containers to the exclusion of no deposit-no return? (Plastic and glass)	____	____	____
2. Would you be willing to limit your purchase to "no phosphate" detergents until an acceptable substitute is found?	____	____	____
3. Would you be willing to vote for bond issues to construct efficient sewage disposal systems? (This means an increase in taxes!)	____	____	____
4. Would you like to see more of our "natural wilderness" area set aside just for the sake of preservation for future generations?			
5. Would you be willing to accept a lower quality fruit and vegetable at your local supermarket at the expense of a marked reduction in the use of pesticides by the growers?	____	____	____
6. Would you be willing to sort paper wastes each week (newspaper, magazines, and others) in order to facilitate ease of pickup for recycling? (This means tying up the bundles.)	____	____	____
7. Would you be willing to pay higher prices for products so that industries can install pollution control devices which would eliminate or reduce pollution of air, land, and water? (Do you really think the industries will absorb the costs without passing it to you - the consumer?)	____	____	____
8. Would you be willing to reduce or eliminate as many of your paper products as possible by doing the following:			
A. Use sponge or cloth instead of paper towels?	____	____	____
B. Use washable diapers, not disposable?	____	____	____
C. Use washable glasses and plates instead of disposal ones?	____	____	____
D. Use cloth napkins instead of paper?	____	____	____
9. DO NOT LITTER! This is the easiest pollution to stop.	____	____	____

LEVEL: 7-9
10-12

SUBJECT: Social Studies

PROBLEM AREA: I-11 Aesthetic Considerations - Recreational Facilities

CONCEPT: III-1 The management of natural resources to meet the needs of successive generations demands long-range planning.

PURPOSE: To understand that short term economic gains and immediate personal satisfactions sometimes conflict with long-term environmental benefits.

REFERENCE: Environmental Educational Instructional Activities for Grades 7-12, New York State Education Department.

ACTIVITY: Use geologic and road maps to locate, if possible, an area of the state that might be proposed as a "forever wild" site. Another possibility would be to identify and locate areas such as the Everglades or the Cascade National Park which have been supporte recently as wilderness areas.

Divide the class into two groups -- one group advocating and defending the creation of the wilderness area; another opposing it. Suggest that attention be given to as many as possible of the groups interested in such areas -- motel operators, restaurant owners, gasoline dealers, guides, lumber companies, campers, backpackers, automobile sightseers, etc.

Suggest the two groups discuss the value of wilderness areas versus the value of commercial development of the areas. How "wild" should the area be? Should snowmobiles and motorbikes be prohibited? Why or why not?

LEVEL: 10-12

SUBJECT: Social Studies

PROBLEM AREA: V-1 Psychological and Behavioral Considerations - Crowding

CONCEPT: II-2 The relationships between man and the natural environment are mediated by his culture.

PURPOSE: To create an awareness of the problem of population distribution in the United States and the variety of potential solutions to this problem.

REFERENCE: "Where Do We Put All the People?" Jo Michalski, Environmental Education Section, Alaska Department of Education.

ACTIVITY: Divide the class into small groups and have each group consider changes in population distribution in the U.S.A. since 1940. (Example of pertinent data is shown below.) What reasons can they suggest for the marked shifts?

The teacher might read and identify on a map of the U.S.A. the problem as presented in an article such as the sample cited below. The article and following short discussion will identify at least four alternative distribution patterns for future U.S. population growth: (1) back to the country (2) to small cities (3) to secondary growth centers (4) to new towns. At least one group should examine each of these possibilities (and others if they appear promising) to determine the advantages and disadvantages of each. Each group should attempt to report its findings in an interesting manner. Finally each student might be asked to express his judgment about the most promising choice(s) either in a simple vote or in a written position paper.

"WHERE DO WE PUT ALL THE PEOPLE?"

The population of the United States is growing rapidly. Mr. Jerome Pickard has looked ahead to 1980 and predicts that the East Coast Megalopolis will contain 106 million people, the California region between San Francisco and Los Angeles will contain 28 million people and that there will be 9 million people in the Florida area. Where can we possibly put all these people?

Most of the population growth in the United States over the next 20 years will take place in the country's large urban areas--the megalopolis. Somehow we have to plan ahead for all the extra people.

The biggest problem posed by the 50 million new Americans expected by 1995 will be to find places for them to live without increasing the decay of our big cities and without polluting our environment. Some people have suggested that we try to attract people to secondary growth centers (smaller cities that have populations of 50,000 to 250,000) and also develop some way of encouraging people who now live in small towns and rural areas to stay where they are. More and more people are leaving the smaller cities, towns and rural areas and moving to the already big cities. This growth of our big cities is posing an array of difficult problems. The most serious problem is the split between the urban and suburban areas of a large city. The central city is decaying and is surrounded by diffuse suburban development accessible only by private automobile. Racial minorities have become isolated in the central cities and as industries move to the suburbs these people are losing their jobs. The economy of the central city is in big trouble while the suburban area is facing equally difficult (if different) problems of how to provide services for the new people and industries moving to their area. The threat to the eco-system is apparent--housing developments, highways, sewage, trash disposal are all present threats to our environment if not handled properly.

What we need are some answers to the question, "Where do we put all the people?" We need to look at all the alternative distribution patterns for future U.S. populations and the feasibility of each. We need to educate our population and upgrade our smaller cities and rural areas to make them appealing to future Americans. (Adapted from "The Next 50 Million Americans", Population Education Newsletter, Vol. 1, No. 1 for use with this activity.)

For Student Group Use -

FARM, CITY, AND SUBURBAN POPULATION, 1940 - 1970*

each symbol = 2,000,000 population

*Source: U.S. Department of Commerce, Bureau of the Census

LEVEL: 7-9
10-12

SUBJECT: Social Studies

PROBLEM AREA: I-11 Aesthetic Considerations - Recreational Facilities

CONCEPT: III-1 The management of natural resources to meet the needs of successive generations demands long-range planning.

PURPOSE: To understand that short term economic gains and immediate personal satisfactions sometimes conflict with long-term environmental benefits.

REFERENCE: Environmental Educational Instructional Activities for Grades 7-12, New York State Education Department.

ACTIVITY: Use geologic and road maps to locate, if possible, an area of the state that might be proposed as a "forever wild" site. Another possibility would be to identify and locate areas such as the Everglades or the Cascade National Park which have been supported recently as wilderness areas.

Divide the class into two groups -- one group advocating and defending the creation of the wilderness area; another opposing it. Suggest that attention be given to as many as possible of the groups interested in such areas -- motel operators, restaurant owners, gasoline dealers, guides, lumber companies, campers, backpackers, automobile sightseers, etc.

Suggest the two groups discuss the value of wilderness areas versus the value of commercial development of the areas. How "wild" should the area be? Should snowmobiles and motorbikes be prohibited? Why or why not?

LEVEL: 10-12

SUBJECT: Social Studies
Science

PROBLEM AREA: II-3 Health Considerations - Air Quality

CONCEPT: I-4 In any environment, one component like: space, water, air, or food may become a limiting factor.

PURPOSE: To understand the historical proof of hazards associated with polluted air in industrialized areas.

REFERENCE: The Breath of Life, Donald E. Carr. W. W. Norton, 1965. Chapter III.

ACTIVITY: Ask two or three students to read the chapter indicated above and to develop "news reports" on air pollution as they may have come from the Meuse Valley in Belgium in 1930 (60 deaths), Donora, Pa. in 1948 (20 deaths) and London in 1952 (4,000 deaths).

Have students "broadcast" to the class as dramatically as possible the conditions that prevailed (weather, transportation, health, safety) during those disasters.

Involve the class in discussing whether such disasters are possible now. Why or why not? What has been done by institutions or individuals to reduce the likelihood of such events?

LEVEL: 10-12

SUBJECT: Social Studies
Science

PROBLEM AREA: IV-6 Eco-Community Relationships - Population Studies

CONCEPT: III-2 Family planning and the limiting of family also are important if overpopulation is to be avoided and a reasonable standard of living assured for successive generations.

PURPOSE: To appreciate the potential threat of the population explosion to traditional personal liberties.

REFERENCE: Teacher Manual, Senior High Idea 1--Land, Environmental Education Project, Box 122, Grafton, Illinois.

ACTIVITY: If mature students have expressed serious concern about consequences of the population explosion and if the school administration and community are committed to examining controversial ideas, the following "bogus bill" can result in examining some fundamental beliefs about the role of government versus the assumption of personal responsibilities.

Ask every member of the class to consider himself or herself as a member of Congress; be willing to speak briefly for or against the proposal with some supporting evidence for the position taken, and finally cast a vote on the bill.

COPY OF SENATE BILL 8690P INTRODUCED INTO THE UNITED STATES SENATE BY SENATOR WARREN OATES OF MINNISINK COUNTY, KANSAS.

CONCOMITANT BILL 487P-1 INTRODUCED INTO THE HOUSE OF REPRESENTATIVES BY CONGRESSMAN PHIL JACKSON OF PEPIN COUNTY, IOWA.

WHEREAS the scientific community indicates a pending disaster for the United States is expected to occur within one generation,

WHEREAS the population of the United States will increase to a total of one billion by the year 2020,

WHEREAS we are currently unable to feed portions of our population,

WHEREAS we are currently unable to house portions of our population,

Sec. I BE IT RESOLVED that as of July 4, 1976, no female residing in the territorial limits of the United States shall be allowed to deliver more than two life offspring.

Subsection A: Any multiple births exceeding two shall be the sole exception.

Subsection B: Live offspring are those that survive a period of ninety days.

Sec. 2 Ninety days after the second delivery, or with the consent of the female at the time of the second delivery, a tubal ligotomy must be performed by any qualified physician in the United States at no cost to the patient.

Subsection A: All physicians performing such procedures must report such action to the District Office of Population Control within ten days on Form 609.31A.

Subsection B: Failure of any physician to comply with the above will have his license revoked for a period of not less than one year.

Sec. 3 PENALTIES

1. Births occuring outside of a registered hospital must be reported to the District Office of Population Control within ten days of birth.

2. Penalties for nonreporting of said birth will be the immediate sterilization of that female.

3. If offspring upon discovery of this delivery are in excess of two, they will be handled as indicated in Part 4 of this section.

4. Any female subject to the provisions of this bill having offspring in excess of two (exception being Sec. 1, Subsection A), shall have the child(ren) removed by the District Office of Population Control--Federal Adoption Division.

Subsection A: Such female shall also be subjected to immediate sterilization.

Sec. 4 Abortions shall be provided by any registered hospital and/or any licensed physician upon demand of any female subject to this bill.

Sec. 5 FEDERAL BONUS FOR POPULATION CONTROL

1. Any married female between the ages of 18 and 40 may take a Federal Tax deduction of $1,000 per annum per child that she has never delivered, up to a maximum of two.

2. Any married female adopting children may take a Federal Tax deduction of $1,000 per annum per child adopted up to a maximum of two.

3. Parts 1 and 2 of this section may be combined.

Sec. 6 PENALTIES FOR MALE PROMISCUITY

1. Rape shall be a Federal offense.

Subsection A: Any male conficted of rape will be subject to immediate sterilization in addition to any applicable prison terms.

2. Any married male impregnating a female other than his wife will be sterilized upon birth of live offspring.

LEVEL: 10-12

SUBJECT: Social Studies
Science

PROBLEM AREA: IV-1 Eco-Community Relationships - Ecological Considerations

CONCEPT: III-1 The management of natural resources to meet the needs of successive generations demands long-range planning.

PURPOSE: To become aware of alternative proposals to avoid worldwide famine and to evaluate their practicability.

REFERENCE: Pollution--Authorized Course of Instruction for the Quinmester Program, Dade County (Florida) Public Schools.

ACTIVITY: Develop with input from the class a list of proposals for avoiding famine such as the following

Farming the sea.

Clearing and farming presently unused areas such as national parks.

Irrigating dry lands by desalted sea water.

Sending people to colonize other planets.

Leave it to natural forces.

Voluntary family size planning.

Compulsory family size planning.

Increasing crop yields by developing new varieties of plants.

Increasing yield by using more fertilizers, pesticides, and herbicides.

Taking care of U.S.A. and not be concerned about other countries.

Divide the class into groups of two or three to investigate each proposal and to report back on their findings and their evaluation of the practicality of the proposal.

After the groups have reported, ask every student to rank the proposals from 1 through 10 according to their personal judgment. Develop a composite rating for the entire class.

Discuss what needs to be done and by whom to implement more quickly the proposals they judge to be most promising.

LEVEL: 10-12

SUBJECT: Social Studies
Science

PROBLEM AREA: IV-4 Eco-Community Relationships - Energy Production and Use

CONCEPT: II-3 Natural Resources affect and are affected by the material welfare of a culture and directly or indirectly by philosophy, religion, government, and the arts.

PURPOSE: To develop an interest in, and understanding of, energy flows and methods of producing energy in terms of resources consumed, techniques of production and distribution, efficiency, quantity of energy, and economic costs and ecological considerations involved.

REFERENCE: Environmental Quality and The Citizen, Clausen and Iverson, Soil Conservation Society of America.

ACTIVITY: Divide the class into groups of four or five. Each group should write down answers to questions such as the following:

> What single activity do we engage in that takes the greatest amount of energy from the environment?
>
> What is the second greatest use of energy?
>
> Do we want to stop or reduce the positive results of these expenditures of energy?
>
> Can we retain the positive benefits and reduce or eliminate the negative products?
>
> Would you be willing to change your life style and reduce your energy consumption as a means of improving the environment?

Answers should be compiled for the entire class and opportunity should be provided for discussion of differing points of view. Out of the discussion some students may acquire interests which could be pursued as individual study projects.

The activity may require two or three days, or even longer, depending on student interest and skill of the teacher in sustaining it.

LEVEL: 10-12

SUBJECT: Social Studies
Science

PROBLEM AREA: I - Aesthetic Considerations
II - Health Considerations
IV - Eco-Community Relationships
V - Psychological and Behavioral Considerations

CONCEPT: III-3 Environmental management involves the application of knowledge from many different disciplines.

PURPOSE: To involve the students in understanding environmental quality problems in their community and in assuming responsibility to work on selected problems.

REFERENCE: To Save The Earth - a Tool Kit to Our Environmental Quality Index by Franklin Gross and Dennis Corso for the National Wildlife Federation.

ACTIVITY: Secure the kit identified above. Study with a class the filmstrip-record and printed materials included. Identify a small nucleus of highly interested students who are interested in EQ problems in their community. Work with the students using the "tool kit" to obtain ideas and strategies for responsible action to involve students and adults in improving the quality of their environment.

LEVEL: 10-12

SUBJECT: Social Studies
Science

PROBLEM AREA: IV-3 Eco-Community Relationships - Natural Resource Use

CONCEPT: III-1 The management of natural resources to meet the needs of successive generations demands long-range planning.

PURPOSE: To understand more fully the environmental problems related to automobile use and to consider ways to improve the situation.

REFERENCE: "Air Pollution Notes" July, 1973. College of Agriculture and Environmental Science, Rutgers University.

ACTIVITY: Read to the class or have them read with you from an overhead projector an article such as the one cited below. Divide the class into small groups of three-four students to:

(1) Suggest specific steps to be taken to reduce gasoline consumption in U.S.A. and

(2) Indicate what needs to be changed or done to permit their suggested steps to be successful.

The Motor Vehicle and Pollution

Herbert L. Sansom of U.S.E.P.A. at a recent meeting of the International Automotive Engineering Congress pointed out that the automobile is the single most important source of air pollution; a major contributor to high levels of urban noise and congestion; a user of over 30 percent of the land area in some urban areas; a killer of more Americans annually than died in the Vietnam war; and a consumer of nearly 14 percent of the total energy consumed in the United States.

In 1970, according to Sansom, motor vehicles used over 90 billion gallons of petroleum products, more than 40 percent of all the petroleum products consumed in the United States in 1970 by all sources, stationary and mobile. He emphasized the air pollution stemming from this large fuel consumption: 66 percent of all man-made carbon monoxide emissions, 48 percent of the hydrocarbon emissions, 40 percent of nitrogen oxide emissions, and 90 percent of all atmospheric emissions of lead.

He cited two possible trends in fuel economy. The increased use of radial tires and more American-made compacts. It has been estimated that a 10 percent increase

in fuel economy can be realized from the use of steel-belted radial tires. Sansom suggested a societal accounting of the automobile -- that its costs and benefits be carefully weighed and balanced. He cited determining factors in the fuel economy of today's cars: weight is the single most important parameter affecting fuel economy; a 5,000 lb. vehicle consumes 100 percent more fuel than a 2,500 lb. vehicle; air-conditioning adds an average fuel penalty of 9 percent; automatic transmissions add 5-6 percent; and the current rotary engine adds an estimated 35 percent in fuel loss.

In summary, Sansom states that the inefficiency of today's automobile is cutting deeply into the available supplies of oil and costing us dearly in foreign exchange. Steps must be taken, and taken soon, to reduce the amount of gasoline consumed by the automobile.

LEVEL: 7-9
10-12

SUBJECT: Social Studies
Science

PROBLEM AREA: IV-3 Eco-Community Relationships - Natural Resource Use

CONCEPT: III-1 The management of natural resources to meet the needs of successive generations demands long-range planning.

PURPOSE: To appreciate more fully the variety of building materials available and the advantages and disadvantages they offer.

REFERENCE: Environmental Educational Instructional Activities for Grades 7-12, New York State Education Department.

ACTIVITY: With input from students develop on the chalkboard a list of the major materials used for building in their locality --wood, brick, stone, concrete, stucco, steel, aluminum, etc.

Ask 2-3 students to find examples of structures made from each material, the source of the material, and the date of construction of the building. If possible, they should also bring to class a sample of the material they are investigating.

The materials may be tested for durability against friction, heat, and water action. Estimates of costs may be obtained from parents, building contractors, or Public Works officials. The class may consider such questions as why most housing in the U.S.A. is wooden but most in Europe is brick. How does climate affect building material? How can durability be increased? What do we sacrifice to provide low cost construction? Is initial low-cost the most important factor to consider? Should we change our construction industry? Why? How?

LEVEL: 7-9
10-12

SUBJECT: Social Studies
Science

PROBLEM AREA: I-6 Aesthetic Considerations - Water Quality

CONCEPT: III-3 Environmental management involves the application of knowledge from many different disciplines.

PURPOSE: To see the effects of soaps and detergents on soiled fabric. To evaluate alternative products to phosphate detergents.

These particular activities could be used in conjunction with a Home Economics unit on laundry. It should be used after discussion of soaps, detergent and their effect on the environment. It is intended for the student to evaluate attitudes on the issue.

REFERENCE: Soaps, Detergents and the Environment...., The Soap and Detergent Association, 475 Park Ave. South, New York, New York 10016.

Problems with Current Phosphate Replacement Materials, Federal Trade Commission Hearing, April 26, 1971.

ACTIVITY: Dirty Detergents

Materials: Four lab teams.
Each team receives: 2 quart jars (each filled with hot H_2O), 1 4" x 4" square of soiled fabric swatch

Procedure:

Team #1 adds 1 Tbsp. phosphate detergent to 1 qt. water
Team #2 adds 1 Tbsp. soap to 1 qt. water
Team #3 adds 1 Tbsp. soap and 1 Tbsp. washing soda to 1 qt. water
Team #4 adds 1 Tbsp. "no phosphate" detergent to 1 qt. water

After each team adds its particular soap or detergent to water, agitate the jar. Add the square of fabric. Cap the jar and shake until fabric is clean. Rinse fabric in the jar of clear water by putting fabric in the jar, capping the jar, and agitating.

Test pH level of wash water using pH paper, Hach kit, or other means.

Compare the cleanliness of fabric swatches and their respective pH levels of the washing water.

LEVEL: 7-9
10-12

SUBJECT: Social Studies
Mathematics

PROBLEM AREA: IV Eco-Community Relationships - Humans

CONCEPT: II-1 The culture of a group is its learned behavior in the form of customs, habits, attitudes, institutions, and lifeways that are transmitted to its progeny.

PURPOSE: To obtain specific data concerning the efficiency of the privately driven automobile as a means of commuting from home to work. To sense the extent to which automobiles appear to be used for personal convenience rather than economical transportation.

REFERENCE: Investigations in Ecology by Schultz and Marcuccio, Charles E. Merrill Publishing Company, Columbus, Ohio, 1972.

ACTIVITY: During morning or evening rush hours, stand with a friend on the sidewalk along a street where commuter traffic passes. Count and record the number of people, including the driver, in each of 100 passenger cars. Record data on a tally sheet. Let one person observe and call out the information to the other person to record.

Data can be collected for the same time on different days as well as during different times of the day such as 8:00 a.m., 10:00 a.m., 12:00 noon, 2:00 p.m. and 4:00 p.m. Data collected can be graphed and discussed to answer questions such as the following:

Why are there so many single-passenger cars?
How efficiently do we use energy (horsepower) to move commuters by automobile?
Why don't we use more efficient means?
Why does the pattern of car use vary from workday to weekend or during the day?

LEVEL: 7-9
10-12

SUBJECT: Social Studies
Fine Arts

PROBLEM AREA: I-7 Aesthetic Considerations - Open Space

CONCEPT: III-1 The management of natural resources to meet the needs of successive generations demands long-range planning.

PURPOSE: To become aware of the results of population pressures on popular vacation areas.

REFERENCE: Environmental Issues Conflict Unit - Teachers Guide and Student Book, Diablo Valley Education Project. Orinda, California.

ACTIVITY: Secure the film "Pave It and Paint It Green" available from EMC Sales (film #7699) or from some rental agency. Show the film and involve the class in discussing what is happening to Yosemite Valley as depicted in the film, or in Yellowstone Park, or other very popular vacation sites they know about through personal experience.

What suggestions can they offer to deal with the problem? To what extent should or must the problem be solved by individuals or by various governmental units? What responsibility are they personally willing to assume?

LEVEL: 10-12

SUBJECT: Language Arts
Social Studies

PROBLEM AREA: I Aesthetic
IV Eco-Community Relationships
V Psychological-Behavioral Considerations

CONCEPT: IV-4 Man has been a factor affecting plant and animal succession and environmental processes.

PURPOSE: Through inquiry and problem solving, it is hoped the student and teacher will:

1. Build a framework of reference through which they may attain an understanding of the causes and effects of our present environmental crisis.

2. Attain an awareness of both the beauty and the ugliness of our environment.

3. Develop a sense of pride and social responsibility for the preservation of our planet.

4. Foster a realistic identity with the social problems relating to our environment.

5. Create the desire to become involved in finding solutions to these problems.

6. Realize the importance of attitudes toward making advances in human conditions.

REFERENCE: Human Implications of a Threatened Environment by Dr. Clair W. Bemiss, Center for Environmental Education, Brevard County Schools, 705 Avocado Avenue, Cocoa, Florida 32922.

ACTIVITY: Ask students to list major industries of America on the board. Divide the class into small groups and have each group select one industry to investigate. At the end of the investigation, each group shall present an oral report of the findings of their investigations. Each report shall include visual aids and real data to support the findings of the group. Major questions to be considered are:

What does the word technology mean to you?
How does technology affect our life style?
What effects of technology have been beneficial to our life style?
What effects of technology have been detrimental to our life style?

How do our cultural elements contribute to environmental degradation?

How does something become typical in our culture?

What elements of our culture have degraded our environment?

Which elements of our culture that degrade the environment could we change?

How has technology offered solutions to our environmental problems?

LEVEL: 7-9
10-12

SUBJECT: Language Arts
Social Studies

PROBLEM AREA: IV-6 Eco-Community Relationships - Population Studies

CONCEPT: III-2 Family planning and the limiting of family also are important if overpopulation is to be avoided and a reasonable standard of living assured for successive generations.

PURPOSE: To involve students in thinking ahead about the impact of population growth on their lives, style and standard of living.

ACTIVITY: Read to the class short excerpts from a book such as Paul Ehrlich's The Population Bomb to dramatize the fact that many countries are growing at a rate that doubles their population every 30 years.

Ask each student to write a story, essay, poem, or other piece of creative writing in which he indicates what such growth might mean to him in the next 30 and 60 years. Suggest he may think in terms of his community, state, nation, the world or some combination of these.

Have some students read their essays or stories to the class, have students exchange writings with a classmate and react to his efforts. Finally attempt through discussion to arrive at some generalizations held by the class. What do these mean as far as our present life style is concerned?

LEVEL: 4-6
7-9
10-12

SUBJECT: Language Arts
Fine Arts

PROBLEM AREA: I Aesthetic Considerations

CONCEPT: II-2 The relationships between man and the natural environment are mediated by his culture.

PURPOSE: Students will express their feelings about a certain area by writing a haiku and drawing a finger-paint picture to accompany the feeling expressed by their haiku.

By using these two methods or forms of expression a student may search out his feelings about an object(s) and express these feelings. The student also works with two media of expression, enabling the student to be able to express himself more effectively.

ACTIVITY: What Do You See? ---- How Do You Feel?

Materials: paper, pencils, temper paint

Procedure: Students are asked to write a haiku about a certain area of his environment (the school lawn and building might be a good first attempt). After writing the haiku, the student is then asked to make a finger-paint picture using only two colors to accompany his haiku. The colors chosen by each student should help express his feelings. (For an example of what a haiku is, see below.)

Haiku is a form of expression, Japanese in origin, used to express kinship with things natural. It is written as follows:

1st line has 5 syllables	Brimming full of life
2nd line has 7 syllables	Heeding nature's starting gun
3rd line has 5 syllables	Pond explodes in spring.

Post and compare the works. Draw upon differences in interpretation and moods expressed. This can easily bring out socio-economic values and is a good discussion motivator. Use in a variety of environments such as parks, ponds, industries, landfills, etc.